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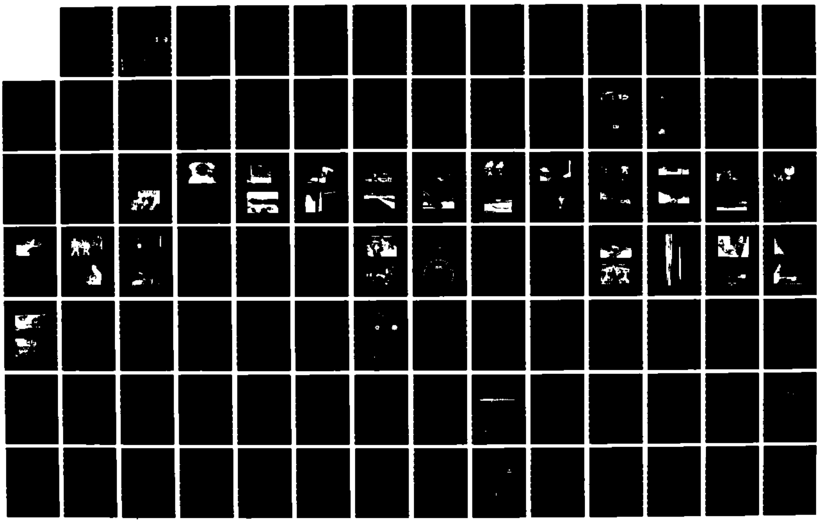

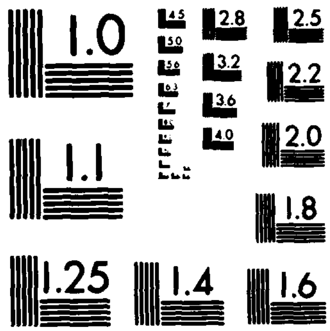
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FAA TECHNICAL CENTER
Atlantic City Airport
N.J. 08405

AD-A171 719

Full-Scale Transport Controlled Impact Demonstration Program Photographic/Video Coverage

John D. Gregoire

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

April 1986

Final Report

This document is available to the U.S. public through the National Technical Information Service, Springfield, Virginia 22161.

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16. Abstract

The Full-Scale Transport Controlled Impact Demonstration Program was recorded on both film and video tape by the Photo-Duplication Section 642 of the Jet Propulsion Laboratory, California Institute of Technology.

Photographic coverage was requested by the Federal Aviation Administration (FAA) on the antimisting kerosene (AMK) fuel and crashworthiness experiments. Instrumentation and documentation cinematography and videography produced a catalog of images that recorded completely the pre-/post-elements of the event.

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PREFACE

This report discusses the photographic/video results and support given by the Photo-Duplicating Section, Jet Propulsion Laboratory, California Institute of Technology, to the Full-Scale Controlled Impact Demonstration Program that was carried out on December 1, 1984, at Edwards Air Force Base, Rodgers Dry Lake, California.

The work described in this report was sponsored by the Department of Transportation and the National Aeronautics and Space Administration under Interagency Agreement DTFA03-80-A-00215, Task Order 13.

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D CONTROLLED IMPACT DEMONSTRATION (CID) POST-IMPACT - INVESTIGATION EXPERIMENT (TEST PLAN)

E IOM, FROM: Review Board, SUBJECT: Controlled Impact Demonstration Readiness Review, 15 August 1984

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G HELICOPTER REQUIREMENTS

H Letter FROM: John E. Reed, SUBJECT: Full-Scale Transport Controlled Impact Demonstration (CID) Program--CID Ground Operations Plan, May 14, 1984, with CID CONTROLLED IMPACT DEMONSTRATION PROGRAM, GROUND OPERATIONS PLAN, DRAFT FOR SIGNATURE, 13 JULY 1984

I MEMORANDUM FOR THE RECORD, FROM: OP/CID Project Manager, SUBJECT: Access to the Controlled Impact Demonstration (CID) Crash Site, January 20, 1984

J FLIGHTLINE VEHICLE TRAFFIC

K 16MM DOCUMENTARY COVERAGE

L ENGINEERING PHASE/TV COMMUNICATIONS

M C.I.D. DAY PHOTO OPERATIONS CHECK LIST and CID FLIGHT CARDS

N CID PHOTOGRAPHY MISSION CRITERIA and PHOTO SUPPORT READINESS CHECK LIST

O SUN POSITION - CID REMOTE SITE

P OPERATING RULES AND PROCEDURES: GO-NO-GO JPL FILM AND VIDEO CAMERA SYSTEMS

Q INTEROFFICE MEMORANDUM, FROM: John E. Reed, SUBJECT: INFORMATION: Full-Scale Transport Controlled Impact Demonstration Program--Public Affairs Interface, Apr 20 1984

R JPL SHIPPERS FOR FAA FLIGHT TEST, VANDENBERG EQUIPMENT FOR FAA FLIGHT TEST, AND MISCELLANEOUS SOURCE EQUIPMENT FOR FAA FLIGHT TEST

S AIRBORNE CONTROL SYSTEM DESCRIPTION INTERFACE WITH EXPERIMENTS

T PHOTOGRAPHY TEAM, CONTROLLED IMPACT DEMONSTRATION

U CID STATION/CAMERA LIST: C.I.D. 720 TRANSPORT CONTROLLED IMPACT DEMONSTRATION: CATALOG FILM/TAPE/STILLS

V PARTICIPATING PERSONNEL/ORGANIZATION, DECEMBER 1, 1984, CONTROLLED IMPACT DEMONSTRATION DAY

W SPECIFICATION/DATA SHEET/CATALOG: Arriflex, D. B. Milliken Company, Instrumentation Marketing Corp., TriTronics, Inc., Spin Physics, Inc., Inframetrics, Hasselblad, Hulcher (Gordon Enterprises), Nikon, Eastman Kodak Company, Visual Instrumentation Corporation

X Photo-Sonics, Inc., SPEC/DATA SHEET, Cine-Sextant Tracking Mount

Y INTEROFFICE MEMORANDUM, FROM: S. Glazer, SUBJECT: Infrared Observations of the CID Test, 1 March 1985

Z TRIP REPORTS -- HELICOPTER TRIP REPORT, 1 DECEMBER 1984, CONTROLLED IMPACT DEMONSTRATION, EDWARDS AIR FORCE BASE; CID SUMMARY, William Tibbitts; CAST GLANCE TRIP REPORT, 1 DEC 1984, Controlled Impact Demonstration; IOM, FROM: Phil Neuhauser, SUBJECT: CID - Cast Glance Report, December 3, 1984; IOM, FROM: GREGG HANCHETT, SUBJECT: C.I.D. DEBRIEF; IOM, FROM: Tom Wynne; IOM, FROM: Gordon Maughan, SUBJECT: CID De-Brief; IOM, FROM: C. BORST, SUBJECT: CID THE REAL STORY; IOM, FROM: S. L. BRIDGES, SUBJECT: Notes on My Part in the CID Photo Coverage, December 10, 1984; IOM, FROM: W. J. Hornaday, SUBJECT: Critique of the CID exercise, December 12, 1984; CID PHOTO NOTES FROM TERRY FAIL; C.I.D. Impressions, Carol L. Lachata; Letter, from ADVANCED TECHNOLOGY DIVISION, SYMBOLIZED SYSTEMS, INC., December 14, 1984; MEMO, FROM Gil Pendley, SUBJECT: HIGH SPEED PHOTOGRAPHIC COVERAGE OF CONTROLLED IMPACT DEMONSTRATION AT EDWARDS AIR FORCE BASE, CALIFORNIA, January 7, 1985; LAST DAYS OF CID, BY TONI BURKE, Comments on CID Test (Bill Shipman)

AA CID GROUND OPERATIONS CREW BRIEFING FOR IMPACT DAY 1 DECEMBER 1984

BB CID DAY LOG

CC Letter from Caesar A. Caiafa, Manager, Crashworthiness/ Structural Airworthiness Branch, ACT-30, August 27, 1984, with ENCLOSURE 2 (SIMULA INSTRUCTIONS)

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EXECUTIVE SUMMARY

The Full-Scale Transport Controlled Demonstration (CID) Program Management Plan DOT/FAA/CT-82-151 became a joint program with FAA's invitation to NASA center to praticipate; specifically, to utilize the photgraphic expertise to the Jet Propulsion Laboratory (JPL), California Institute of Technology.

The requirements and needs of the CID program with respect to photographic/video coverage were analyzed and evaluated by JPL for (1) the ground impact and (2) the aircraft structure. Photo-instrumentation was to cover a listing of subjects before, during, and after the time of impact. Documentation coverage was to be taken on both film and video. Standard cameras and state of the art equipment would be needed. Personnel would install, operate, maintain, and remove the instrumentation. The JPL Photographers Group organized and provided the equipment, materials, and personnel. Descriptions of cameras, locations, film, tracking systems, operations, infrared observations, and personnel are in the report and appendixes. The JPL photographic support to the CID program, the film recovery and processing, and the several thousand units of photographic, cinematographic, and videographic deliverables are itemized and cataloged.

The photographic results of the JPL support and coverge of the CID will make a major contribution to continued aircraft safety research.

1. INTRODUCTION AND BACKGROUND

1.1 INRODUCTION

At 9:22:10.97 a.m. on Saturday, December 1, 1984, a remotely piloted four-engine Boeing 720 167-passenger transport plane was intentionally crashed on the Rogers dry gravelstone lakebed at Edwards Air Force Base (EAFB), California. On the ground were 294 personnel from the Federal Aviation Administration (FAA), National Aeronautics and Space Administration (NASA), United States Air Force (USAF), National Transportation Safety Board (NTSB), Langley Research Center (LaRC), Dryden Flight Research Facility (DFRF), Jet Propulsion Laboratory (JPL), and other organization plus news media.

1.2 BACKGROUND OF AGENCY PROGRAMS

1.2.1 Basic FAA Responsibilities

The Federal Aviation Administration is charged with regulating air commerce to foster aviation safety; promoting civil aviation and a national system of airports; achieving efficient use of navigable airspace; and developing and operating a common system of air trafic control and air navigation for both civilian and military aircraft (A/C). The agency issues and enforces rules, regulations, and minimum standards relating to the manufacture, operation, and maintenance of aircraft. The research and development (R&D) activities of the FAA are directed toward providing the systems, procedures, facilities, and devices needed for a safe and efficient system of air navigation and air traffic control; and in developing and testing improved aircraft, engines, propellers, and appliances. (Reference 2.)

1.2.2 Research and Development

Research work by the Aircraft and Airport Systems Technology Division, FAA Technical Center located at the Atlantic City Airport, New Jersey, includes engine/fuel safety and the structural crashworthiness of the aircraft for both crew and passenger safety. (Reference 3.)

1.2.2.1 Antimisting Kerosene. The fire safety (flammability) and engine performance (combustion) characteristics of fuels burned in jet aircraft engines has been a public and agency concern for several years. It has been theorized that antimisting kerosene (AMK) added to jet fuel will prevent the

characteristic "fireball" that sometimes occurs following an otherwise survivable disaster or air crash. In low vapor pressure fuels (such as aviation kerosene), fire may be prevented if the high air-fuel shearing action (as the fuel spills from ruptured tanks during a crash) can be kept from forming a highly flammable mist. The desired result may be achieved by blending a small amount of a proprietary high molecular weight polymer (FM-9)™ with standard jet fuel, giving the fuel the property of resisting mist formation. (Reference 4.)

Simulated airplane impact tests conducted by the FAA from 1978 to 1983 have demonstrated that antimisting kerosene will prevent the characteristic "fireball" that sometimes occur following an otherwise survivable crash.

1.3 NASA STATUTORY FUNCTIONS

The principal statutory functions of the National Aeronautics and Space Administration are to conduct research for the solution of problems of flight within and outside the Earth's atmosphere and develop, construct, test, and operate aeronautical and space vehicles; conduct activities required for the exploration of space with manned and unmanned vehicles; arrange for the most effective utilization of the scientific and engineering resources of the United States with other nations engaged in aeronautical and space activities for peaceful purposes; and to provide for the widest practicable and appropriate dissemination of information concerning NASA's activities and their results. (Reference 5.)

1.3.1 NASA Research Activities

NASA has ongoing crashworthiness/crash behavior research activities, which include analytical model development, static and dynamic section tests, full-scale aircraft drop tests, and comprehensive load definition and structural failure evaluations. These activities are conducted at the Langley and Dryden research centers.

1.3.2 Joint Participation

The FAA invited NASA to participate in and support its AMK and crashworthiness experimentation and the controlled impact demonstration of an actual passenger transport. The CID program was to be the culmination of the research investigations and tests in an air-to-surface impact demonstration.

1.3.3 Controlled Impact Demonstration Program

The Full-Scale Transport Controlled Impact Demonstration Program Management Plan (DOT/FAA/CT-82-151), dated January 1984, as approved jointly by the Federal Aviation Administration and the National Aeronautics and Space Administration, defined and set up the following five program experiments:

(1) Demonstration of antimisting kerosene fuel performance.

(2) Structural (fuselage, wing) measurements.

(3) Occupant and cabin restraint systems.

(4) Cabin fire safety.

(5) Digital flight data recorders (DFDR)/cockpit voice recorders (CVR).

(6) Stowage compartments/galleys.

(7) Hazardous waste containers.

1.4 NASA CENTERS INVOLVEMENT WITH CID

Three NASA centers were among the various organizations involved in the crash experiment. The NASA Langley Research Center assignment was to provide the structural crashworthiness instrumentation and the CID program data acquisition system (DAS). The NASA Ames/Dryden Flight Research Facility (DFRF) assignments were AMK test support, crashworthiness, cabin fire safety experiment instrumentation and data acquisition integration, remotely piloted vehicle flight control system (RPV/FCS) design and development, ground and flight test operations, the impact (I) demonstration, and data reduction and analysis. The Jet Propulsion Laboratory, a government-owned facility that is operated by the California Institute of Technology under a contract with NASA, was to record and document photographically the CID experiment as conducted by the FAA and NASA.

This document reports on the JPL photographic plan, the support effort expended for CID, and the film and tape results. (The JPL photographs are shown at the end of each section. The supporting materials, details, reports, data sheets, etc., are given in appendixes. Abbreviations and acronyms used in the report are given in the glossary.

2. EVALUATION AND PLANNING

2.1 REQUIREMENTS AND NEEDS

To document the CID for analysis and evaluation purposes, JPL used cinematography, videography, and still photography cameras, lenses, and equipment. As with all of its remote operated photographic research and development projects, JPL prepared an operational supporting document to the basic project plan to identify the requirements and needs of the experiment. (See Appendix A, Full-Scale Transport Controlled Impact Demonstration Program, Photographic/Video Coverage Plan, FAA/NASA, March 1984.) The Jet Propulsion Laboratory evaluated and identified the requirements and needs for the CID program as follows.

(1) Complete still (S), video, and motion picture coverage documenting the aircraft experiments, installation and integration of equipment, fight operations, and controlled impact demonstration.

(2) Ground camera documentation of the appropriate portions of the total flight profile and impact scenario through slideout and deceleration to rest.

(3) Airborne camera coverage of designated portions of the total flight profile and impact scenario through slideout and deceleration to rest.

2.1.1 Coverage Plan for Impact

JPL's basic plan for coverage was to photograph the test airplane eight to ten seconds prior to impact, through the entire lakebed slideout, and until the fuselage came to a final rest. JPL determined the selection of cameras, lenses, film speeds, frame rates (frame per second, fps), and the locations of manned and unmanned equipment to support the following specific CID requirements.

(1) Ground cameras documentation or coverage of all or the appropriate portions of the total flight profile, impact scenario, through slideout, and deceleration to rest.

(2) Camera coverage on both sides of the impact site and heading from prior to impact, during slideout, and deceleration to rest.

(3) Camera coverage at both ends of the runway impact and slideout site.

(4) Photographic coverage of the aircraft from take-off and final approach, to initial impact with the ground or initial impact to the wing obstructions, through slideout, and deceleration (to a minimum of 100 knots) necessary to produce the following:

(a) Detailed high speed continuous tracking using high resolution color film for digital image enhancement analysis of the following:

1. Airborne fuel mist cloud from wing release point to at least 300 feet aft.

2. Development of fireballs from the wing back aft to at least 300 feet.

3. Ignition source verification.

(b) Detailed film verification of ignition sources from both sides of impact centerline.

(c) High speed still photography using high resolution color film.

(d) A full frame, high resolution detail of the following:

1. The wing fuel release points.

2. Obstruction impacts.

3. Engine separations.

4. Slideout time/distance to/from obstructions.

(5) Continuous photographic coverage of aircraft from approximately 10 seconds prior to initial impact through slideout up to a minimum of five minutes after rest to produce the following:

(a) Overall, clear, high resolution color film from an elevated position (airborne) abreast the aircraft with a minimum 500-foot field of view (from nose of aircraft aft).

(b) Overall, clear, high resolution color film from a ground level position abreast of the planned impact with continuous aircraft motion tracking onto high speed and standard video tape and 16-mm high speed film formats.

(6) High speed film coverage from the aircraft vertical stabilizer viewing forward from time of initial impact through slideout.

(7) Range time information on all film and video for correlation with all airborne and ground data acquisition.

(8) High speed film coverage from the nose camera position.

2.1.2 Coverage Plan for Aircraft Structure

The CID structural experiment involved measurements of fuselage and

wing deformation obtained from both on-board accelerometer and strain gage instrumentation and motion and still photography and video instrumentation located externally at the impact site. Photo time coding put on the film was for the purposes of correlating the deformation effects between the on-board instrumentation and the ground-based coverage of the aircraft grid locations. To accomplish this effort, JPL determined that the ground cameras, lenses, speed, location, etc., conformed with the following requirements and needs:

(1) Ground cameras documentation of all appropriate portions of the total flight profile and impact through slideout and deceleration to rest.

  (a) Camera coverage on both sides of the impact runway heading from prior to impact, to slideout and rest.

  (b) Camera coverage at both ends of the runway impact and slideout site.

(2) Motion and still photographic and video instrumentation coverage, shutter speed and film, and resolution of quality and quantity to measure the following:

  (a) Aircraft attitude and ground position grids.

  (b) True airspeed at impact (data base).

  (c) Time and duration of impact (data base).

  (d) Crushing of fuselage structure at impact point.

  (e) Starting of any fuselage rupture, wing failure, engine separation, etc.

  (f) Engine separation.

(3) Continuous photographic coverge of aircraft from approximately 10 seconds prior to initial impact through slideout up to a minimum of five minutes after rest to produce the following:

  (a) Overall, clear, high resolution color film from an elevated position (airborne) abreast the aircraft with a minimum of 500-foot field of view (from nose of A/C aft).

  (b) Overall, clear, high resolution color film from a ground level position abreast of the planned impact with continuous aircraft motion tracking onto high speed and standard video tape and 16-mm film formats.

(4) High speed film coverage from aircraft vertical stabilizer viewing forward from time of initial impact through slideout.

(5) Range time coding on film and video for correlation with airborne and ground data acquisition.

Additionally, the CID program had requirements for photographic coverage of the occupant and cabin restraint systems (as well as the cabin itself) and the digital flight data recorder and the cockpit voice recorder. These additional requirements were met by the plan coverages for the impact and the structure experiments.

Details of the Photographic/Video Coverage Plan as prepared by JPL are given in the following attachments to the plan (Attachments A to L of Appendix A):

A. Aircraft Grid Locations

B. Ground Camera Positions Un-manned:Fixed:Remote

C. Ground Camera Positions Un-manned:Special:Remote

D. Manned Camera Stations

E. Composite Camera Positions

F. Air Platform (Helicopters)

G. Cockpit Cabin Camera

H. Nose Camera

I. Tail Camera

J. CID Impact Site Schematic (Figure 8)

K. Controlled Impact Demonstration, Ground Photography, Safety

L. Brief Task Implementation Plan for the Full-Scale Transport (B-720) Crash Test Ground Photo Instrumentation, Documentation and Analysis (Task 13)

2.1.3 Impact Site and Flight Profile

The controlled impact demonstration was conducted on the Rogers dry lakebed at Edwards Air Force Base, California. Maps indicating the impact site and flight profiles are contained in Appendix B. Security control and access to the impact site and the impact and crash flight profiles, race track pattern, and glideslope intercept are shown in the appendix figures.

2.1.4 Pre-/Post-Test Documentation

"Pre-/Post-test Assessment/Photographic Documentation of FAA Crashworthiness Experiments" was prepared as Attachment M to the Photographic/Video Coverage Plan (March 1984). The enclosure amendment indicated JPL pre-test countdown times as T - 3 hours, JPL final film load, calibrations, etc.; T + 1 min., JPL start photographic/video film removed (ground); T + 3 hours, LeRC/JPL start onboard photographic/video film removal, JPL start

experiment photographic documentation; and T + 2 days, JPL complete experiment photographic documentation. Post-impact operations were the following. The camera/film removal responsibility of JPL was time scheduled for T + 30 min. thru 1/2 day. The AMK experiment documentation was T + 1/2 day thru 2 day and T + 9 thru 10 day. The crashworthiness/fire safety experiment documentation responsibility was T + 1/2 day thru 3 day and T + 9 day thru 10 day. (See Appendix C.)

The "Controlled Impact Demonstration (CID) Post-Impact - Investigation Experiment (Test Plan)" indicated the first order of business, following delethalization, would be a separate JPL responsibility for photographic documentation of the CID experiments. (See Appendix D.)

2.1.5 Review Board

As a standard practice, a Jet Propulsion Laboratory review board met 2 August 1984 to review JPL's readiness for the CID experiments. The board discussed four concerns regarding the Photographers Group's readiness, and made four recommendations to improve the Laboratory's support to the CID, as well as specifying agencial and commercial photographic and film processing support (see Appendix E).

2.1.6 Photographic Support

The preliminary plan for JPL photographic support for the CID program was prepared October 1983 by John D. Gregoire, supervisor of the JPL Photographers Group. The preliminary plan was to mount three cameras to photograph the impact from the nose, cockpit, and tail of the plane. Camera specifications, suggested camera lens and film speeds, engineering sketches, and camera angle views were presented (see Appendix F).

2.1.7 Helicopter

The JPL basic plan was to cover the crash from all possible ground and air to ground (A/G) angles. Two helicopters were utilized for the CID experiment to photograph the impact from 750- to 1,000-foot altitudes-providing low altitude elevated 750-foot distance views of the impact site, the actual impact, and the post-impact investigation and fire control activities. Each helicopter carried a photographic crew consisting of one motion picture camera operator and one still photographer (see Figures 1 and 2 at the end of this section). The cameras were 500-frames per second Milliken high-speed motion picture camera with 50-mm lens and an Arriflex M camera with motion control Dynalens and 50-mm lens. Both cameras were affixed to a continental tension controlled mount. The still photographers used 14-S motorized Photo-Sonics 70-mm cameras. (For additional information, see Appendix G, Helicopter Requirements.)

2.2 GENERAL PHOTOGRAPHIC COVERAGE CONSIDERATIONS

The JPL photographic/video coverage plan for the CID experiment

also took into consideration such matters as safety and security requirements, film recovery after the impact, sun angle (position) and environmental factors (heat mirage, atmospheric air quality), preimpact tests for calibration of systems, timing, communications, safety procedures, flight profile, termination envelope, abort "Go/No-Go" criteria, film processing, distribution of film/audio visual material, cine-sextant tracking cameras, time of day, and cabin video plans. Some of these considerations are discussed in the following subsections.

2.2.1 Safety

The JPL Photography Group maintained a perfect safety record throughout the CID operation by using, as guides, the Controlled Impact Demonstration Program Ground Operations Plan (GOP) (Appendix H), "Access to the Controlled Impact Demonstration (CID) Impact Site," DFRF IOM (Appendix I), and "Flightline Vehicle Traffic" document (Appendix J). The Flightline Vehicle Traffic document is identified especially for JPL's two successful evacuations on CID day following the convey commander (CC) and for the JPL formation and movement at Site 17/22.

2.2.2 Documentary Coverage

The set-up of remote and unmanned tracking mounted cameras at the CID site by contractors from Vandenburg Air Force Base (VAFB) and Dahlgren Naval Surface Weapons Center (DNSWC) and the installation of the cameras on-board the aircraft by Langley Research Center personnel, as well as the nose, cockpit, and tail camera installations by JPL personnel, was recorded by 16-mm motion picture cameras on Tuesday and Wednesday, November 27-28, 1984. Coverage of the final CID preparations and fuel blending was on Thursday and Friday, November 29 and 30, 1984 (see Figure 3). The coverage documentation of the NASA 25 van operations and activities at camera Site 17/22 (see Figure 4) was also done by the 16-mm photographer-crew (see Appendix K).

2.2.3 Communications

Direct communications between the CID Ground Operations Managers (GOMs), the JPL Photographic/Video Documentation director, and the JPL support team was provided by hand-held very high frequency (VHF) radio units. Communication frequencies for transmitting and receiving messages were designated by the DFRF frequency range officer each day, subject to US Army first call priority for the frequencies. Photo/TV operations and firefighting photographers communications and call signs are indicated in Appendix L.

2.2.4 Checklist and CID Flight Cards

The photo operations checklist and the CID flight cards for JPL support are indicated in Appendix M.

2.2.5 CID Photography Mission Criteria and Photo Support Readiness Checklist

The CID photography mission criteria for ground photographic/video system (GPVS), remote tracker mounted camera system (unmanned), tracker mounted camera system (manned), remote high speed film video, speciality, and still camera system, documentary motion picture camera and others (manned), CID airborne photographic/video system (APVS), cabin closed circuit video camera, helicopter(s) and P-3 photographic/video system, and high speed motion picture/video camera are indicated in Appendix N, together with the photo support readiness checklist.

2.2.6 Sun Position

The Sun angle or position at sunrise 6:40 a.m. (PST) on December 1, 1984, is zero degrees. For an early CID airplane takeoff at eight o'clock, the Sun angle would be 11°. For a late takeoff at nine o'clock, the Sun would be at 20.5°. (See Appendix O for azimuth positions at the CID remote site.)

2.2.7 Termination

The Jet Propulsion Laboratory photography/video coverage plan considered two different levels of termination of photographic instrumentation because of video recorder running time and camera film off-loading, cleaning, and reloading.

Level 1: The video recorders were limited by a one-hour running time. If everything ran on schedule, from the point at which the recorders were activated, the plane could perform one go-around and there would still be enough time left to record a successful approach, impact, and post-impact activity. If two go-arounds were called, there would have to be:

(a) A hold in the countdown to allow time to rewind and to restart the video recorders.

(b) Termination of the test because the weather or some other factor would not be correct after such a delay in time.

(c) Sacrifice the coverage to be gained by the video and continue with the test.

Level 2: The on-board cameras and all land- and air-based cameras were programmed to start when the aircraft descended below 150 feet. If after reaching 150 feet the pilot decided to perform a go-around, all cameras would be operating at full speed and would continue until they had exposed their film loads.

If the go-around was successful, the cameras would be functioning and would record the impact. If the go-around was unsuccessful, the test would have to be terminated and rescheduled for the following day, to allow the technicians time to off-load, clean, and re-load the cameras.

A decision could have been made to go ahead with the test without photographic instrumentation, and to depend only on the video to record the data; but this was highly unlikely.

2.2.8 Go/No-Go

The operating rules and procedures for the JPL film and video camera system to "go or no-go," that is, operate or not operate the cameras and instruments, were developed by the Photography Group for CID mission segments pre-brake release, take-off roll, airborne climb pattern, final approach, and final approach less than 400 feet (see Appendix P). Included also in Appendix P are "go/no-go" weather factors (winds, turbulence, and visibility) that had to be considered for the CID mission.

2.2.9 Public Affairs Interface

The "Controlled Impact Demonstration/Public Affairs Interface," Attachment 1 to IOM FROM: John E. Reed, Program Manager (PM), SUBJECT: INFORMATION: Full-Scale Transport Controlled Impact Demonstration Program - Public Affairs Interface, dated April 20, 1984, is included in Appendix Q, together with the IOM.

2.2.10 Seat Restraint System

One of the five CID program experiments concerned occupant and cabin restraint systems. (See Attachment M of Appendix C.) FAA instructions covering the JPL photographic documentation of the seat restrain system provided for detailed photo coverage of the 22 Simula Inc. experimental seats, and also the FAA pilot seat (and instrumented dummy), the FAA composite seat, FAA forward flight attendant seat, the French seat, and two NASA seats. (See FAA and Simula Inc. letters, Appendix CC.) Figures 4-A and 37-A are JPL pre-impact medium close up (M.C.U.) and medium shot (M.S.) photographs of the experimental seats occupied by the instrumentated anthropomorphic dummies. (See Figure 4-A on page 18; Figure 37-A, page 40.)

FIGURE 1. ARMY HELICOPTER WITH PHOTOGRAPHER SEATED IN GYRO-CONTROLLED MOUNT

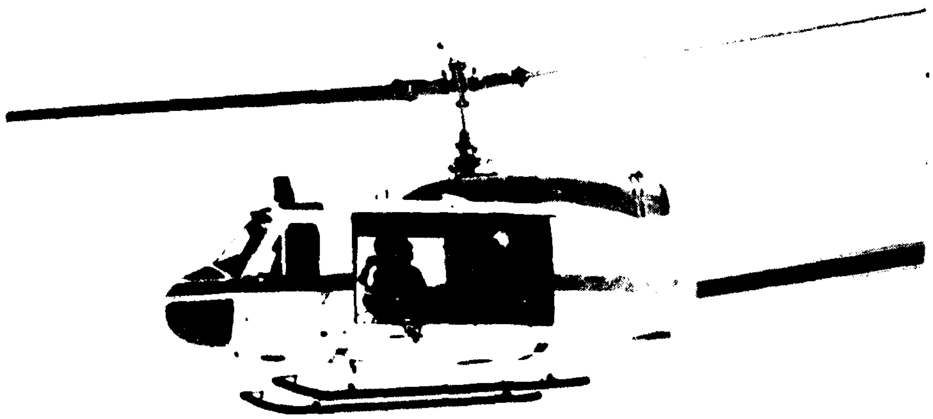

FIGURE 2. AMES PHOTOGRAPHIC SUPPORT CREW HELICOPTER

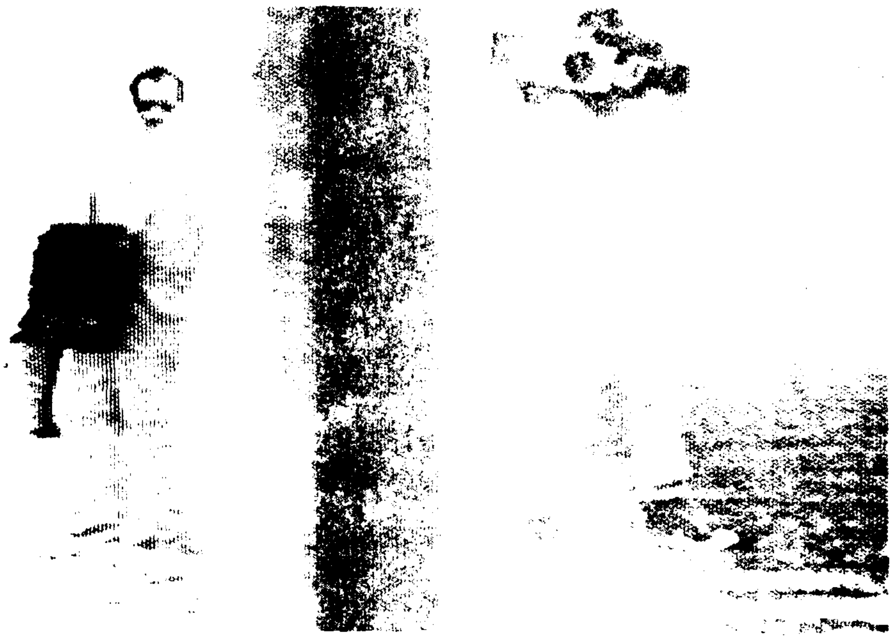

FIGURE 3. IMPACT SIT[illegible] DOCUMENTATION CREW

FIGURE 4. SITE 1 [illegible] MENTATION CREW

3. EQUIPMENT AND ORGANIZATION

3.1 PRIMARY MISSION

As a center operated for NASA by the California Institute of Technology, the Jet Propulsion Laboratory's primary responsibility is the exploration of the solar system with unmanned spacecraft. The history and information about Earth, Moon, solar system, and deep space projects has been photographically recorded since December 3, 1958, by the Photography Services Group of the Photo-Duplicating Section of JPL's Documentation and Material Division.

For the FAA unmanned airplane CID program, the Photo Services Group was called upon to provide the cinematographical, videographical, and still photographical coverage as follows:

(1) Document with standard equipment the preflight events around the plane such as fuel blending, refueling, taxiing, etc.

(2) Document with standard, high speed, and state of the art equipment the impact events at photography stations covering the events from the impact point to where the plane comes to a stop.

(3) Document the fire and fireball growth rate with JPL's new image enhancement techniques.

JPL assembled and provided all photography equipment, raw materials, and operating personnel to do the above. The JPL support of CID, the results, and the deliverables to FAA are discussed in this section. What was done, what was accomplished, and the details of the JPL support are provided in the appendixes. Photographs of support activities are at the end of this section.

3.2 PHOTOGRAPHIC EQUIPMENT

3.2.1 CID Photographic Inventory

The standard photographic and state of the art instrumentation and ground support equipment (GSE) utilized for the CID was obtained from the Jet Propulsion Laboratory, Vandenberg Air Force Base, the NASA Ames (A) and Dryden centers, and the Dalgren, Point Mugu, and China Lake naval stations.

3.3 AIRCRAFT CAMERAS

The JPL on-board camera system consisted of cameras mounted in the nose cone of the 720B aircraft and in the cockpit doorway. Power to the cameras was provided by battery packs located in the forward and aft flight attendants compartments. (See Appendix S, Airborne Control System Description Interface With Experiments.) A third camera and battery pack was located on the vertical stabilizer of the aircraft. Figures 5 to 10 (at the end of this section) show the locations of the three cameras installed in the aircraft prior to the final crash flight and the scenes from each camera.

3.4 PHOTOGRAPHY TEAM PERSONNEL

To operate 181 pieces of photographic equipment such as cameras, lenses, batteries, flash units, power supplies, tripods, mounts, timers, recorders, monitors, electricity generators, microwave horns, dewars, cherry pickers (CP), telescopes, etc., plus dozens of government transport vehicles and automobiles, a team of 59 personnel was organized from JPL, Vandenberg Air Force Base, Point Mugu Pacific Missile Test Center (PMPMTC), Dahlgren Naval Surface Weapons Center, the FAA, and several commercial organizations. The photo tasks assigned to the personnel were to set up, test, and maintain the equipment, off-load, clean and reload cameras, provide hand held video camera support, control and expedite film and tape, monitor video recorders, operate generators, and various other tasks. (For the name of each personnel, task, affiliation, vehicle, evacuation time, and position at impact, see Appendix T, Photography Team Controlled Impact Demonstration.)

3.5 CID STATIONS AND CAMERAS

The unmanned, remotely piloted airplane was photographed by JPL from 22 locations on the Rogers dry lakebed at Edwards Air Force Base. The impact/slideout site was a four-inch deep gravel, stone, and sand bed 300-ft wide by 1,200-ft long. (See Appendix A-31.) Eighteen camera stations (nine on each side) were 500-ft equidistant from the impact/slideout bed. One camera station was located at each end of the site. The eighteen stations, which were all unmanned, had one to eight photographic cameras with 8- to 500-mm lenses, operating from 1.5 to 1,000 frames per second (fps). The camera stations and a description of the coverage from the stations, locations of motorized still (S) cameras, generator layout, range posts and flash bulb locations, and radio camera controls are given in Appendix U. Details of photographic shooting were specified for each station with respect to close up (C.U.), extreme close up (E.C.U.), long shot (L.S.), medium close up (M.C.U.), or medium shot (M.S.) are in the appendix. Photographs of remote camera Stations 11 and 5 and coverage are shown in Figures 11 to 14. The Spin Physics high speed video camera Station #21 and its view are in Figures 15 and 16.

3.6 PARTICIPANTS

Personnel participating in the CID numbered 294 on December 1, 1984. The organizations represented by the personnel were government agencies (including Congress), a foreign embassy, military services, NASA centers

(including JPL), aerospace companies such as Boeing, Lockheed, Douglas, and engineering, scientific, and technical companies with special expertise such as Pratt & Whitney, GE, Dow Chemical, Smith Engineering, Spin Physics, Quintron, Weber Aircraft, Zybion Corp., and others. CID lakebed functions and tasks of the personnel ranged from security, command, documentation, salvage, service, safety, research, systems, investigation, survival, inspection, structure, fire, training, observer, support, retrieval, and preflight to such specialties as damage, quality assurance, measurement, avionics, breathing, dispatch, driving, etc. (See Appendix V.)

3.7 CAMERAS, FILM, AND TRACKING SYSTEM

The JPL Photography Group utilized 129 cameras of four types (motion picture, video, infrared, and still) to fully cover the CID. Eighty three cameras were 16- and 35-mm high speed motion picture cameras. Technical specification sheets and brochures of the Arriflex, Milliken, and the Photo-Sonics motion picture cameras are in Appendix W/1-13. Twelve high speed video (HVS) cameras were of TriTronics, Inc., and Spin Physics, Inc., manufacture (Figure 17). (Data sheets are in Appendix W/14-19.) One camera used by JPL was an infrared imaging system manufactured by the inframetrics Company (see Appendix W/20-21). Twenty-six cameras were still cameras. Hasselblad, Hulcher, and Nikon were typical standard (2 1/4 x 2 1/4 in. and 35 mm) still cameras used. (See data sheets, Appendix W/22-26.)

Both 16- and 35-mm color high speed negative film, video news film, high speed daylight film, and color negative film were used by JPL photographers in their cameras. (See film data sheets, Appendix W/27-31.) In addition, the JPL group utilized a manual optical tracking system because of the requirement for greater precision and heavier camera payloads. (See Visual Instrumentation Corporation OE-84B Optical Tracking System data sheets, Appendix W/32-34.)

3.8 CINE-SEXTANT TRACKER

A special CID requirement was continuous tracking of the 720B during the full slide-out to rest. The tracker equipment had to be in the termination crash envelope (see Appendix B-3) to get the optical clarity required by the CID project. The equipment had to be modified to operate remotely. A microwave video system was built and installed for visual (remote) tracking. A frequency modulation (FM) start/stop switching device was designed to command the cameras (Figure 18). Also an FM time base date frequency was used for IRIG (Inter Range Instrument Ground) timing. A multichannel FM signal was incorporated to operate the cine-sextant tracking mount. (See Photo-Sonics, Inc., Spec/Data Sheet, Appendix X.) There were no redundant backup systems available, but parts were made for quick modular replacement.

In testing the tracking camera system (TCS), several problems occurred, which were resolved. For example, signal output was low. Larger transmitter and receiver antennas solved this problem. Signal skip off the dry lakebed was overcome by a move to a nearby hill (Station C-7). The tracker setup and three remote tracker views are in Figures 19 to 22. The problem of sharing a radio frequency (RF) with the U.S. Army was not workable.

The military flight programs restricted JPL use of the frequency only during the early morning or late at night. All of the modified state of the art equipment operated without a problem. The manned cine-sextant tracking mount manufactured by Photo-Sonics, Inc., tracked flawlessly, its cameras received and recorded the IRIG timing, and operated as planned. The 14 cameras mounted on-board the sextant are shown in Figure 23 with a view in Figure 24.

The video signals were recorded on the mount as well as transmitted to the photo ops van.

3.9 OPERATIONS EXPERIENCE AND QUALIFICATION

The entire JPL photographic/video team ran through the CID operations during practice dry run Flights 12 and 13, to check on how things worked (i.e., cameras OK, shutter speed set, film loaded, equipment functional, etc.). Several matters turned up, which were resolved by the JPL team. For example, the compatibility of the remote tracker as a complete unit was continuously tested on Flight 13. The manned tracker was AOK, a piece of proven hardware whose reliability had been proven at the Vandenberg AFB Western Test Range. The team made a modification of the remote fixed cameras after Flight 12 and tested the modification out before Flight 13. The camera delay timers were set when the flight card was fixed. The air support circuit breaker blew out on Flight 12; it was replaced and tested on Flight 13. In general, the JPL team became extremely familiar with their assignments and equipment at designated stations, and received extra training in CID procedures during Flight 13.

3.10 INFRARED OBSERVATIONS

An Inframetrics model IRTV 525 real-time scanning infrared (IR) radiometer (Figure 25) was used to record infrared images of the CID crash. The original purpose of using the IR radiometer was to corroborate the high speed visual films. The scanner unit was mounted on a remotely controlled tracking platform about two thousand feet from the touchdown point. Post crash analysis of the video tape clearly shows the heat (IR radiation) from the initial burning. The growth of the burning fuel cloud emanating from Engine Number 3 is shown. (See Appendix Y.) It was intended to use the infrared observations to verify other ignition sources and hot objects that could not be obtained with conventional photography.

3.11 TRIP REPORTS

The JPL photographic/video personnel performed many important tasks for the CID program. In accordance with standard instruction and practice, personnel routinely prepare and submitted trip reports after the completion of their trips. Personnel assigned to operate cameras on-board the Army and NASA helicopters gave personal impressions regarding the roles they played covering the crash (see Appendix Z/1-4). One of JPL's managers was on-board the Navy P-3 Orion aircraft with the Cast Glance photographic crew, and operated a 35-mm Nikon camera from the rear starboard fuselage "belly" view port (see Appendix Z/5-9). (Cast Glance coverage photographs are Figures 26 to 28.)

Four JPL personnel set up video cameras and recorders and photographed the fire fighting from four of Edward's fire-crash trucks (see Appendix Z/10-20). (Fire fighting photographs are Figures 29 to 32.) The Norelco TV cameras, Sony 2860 videocassette recorder, 19-inch color monitor, Plumbicon camera, and duplicating equipment were operated by JPL members (see Appendix Z/21-22). Comments on the operation of the FLIR 2000A IR imaging system are in Appendix Z-23. Additional Vandenberg and JPL trip reports are in Appendixes Z-24 and Z-25. Correspondence reports from Symbolized Systems, Inc., and Visual Instrumentation Corporation are in Appendixes Z/26-27 and Z/28-30. The last days of CID are reported in Appendix Z/31-34. The Naval Surface Weapons (Dahlgren, Virginia) trip report about the remote control turn-on system is in Appendix Z/35-36.

FIGURE 4-A. MEDIUM CLOSE UP PHOTOGRAPH OF DUMMIES IN SIMULA SEATS

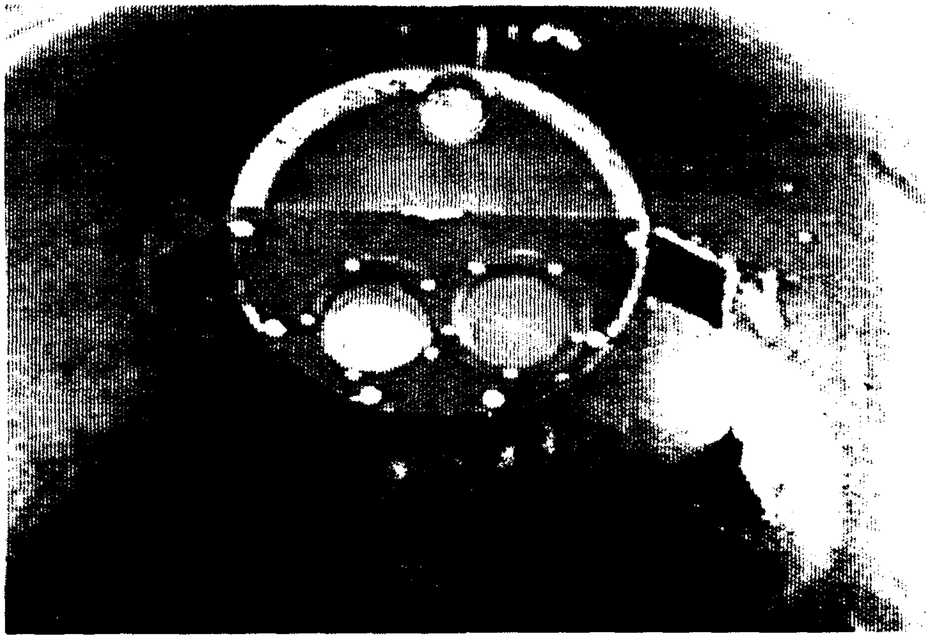

FIGURE 5. REMOTE NOSE CAMERAS IN PLACE

FIGURE 6. NOSE CAMERA COVERAGE SHOWING APPROACH TO IMPACT, CALIBRATION POSTS, AND FLASH BULB SYNCHRONIZATION LIGHTS (ARROW)

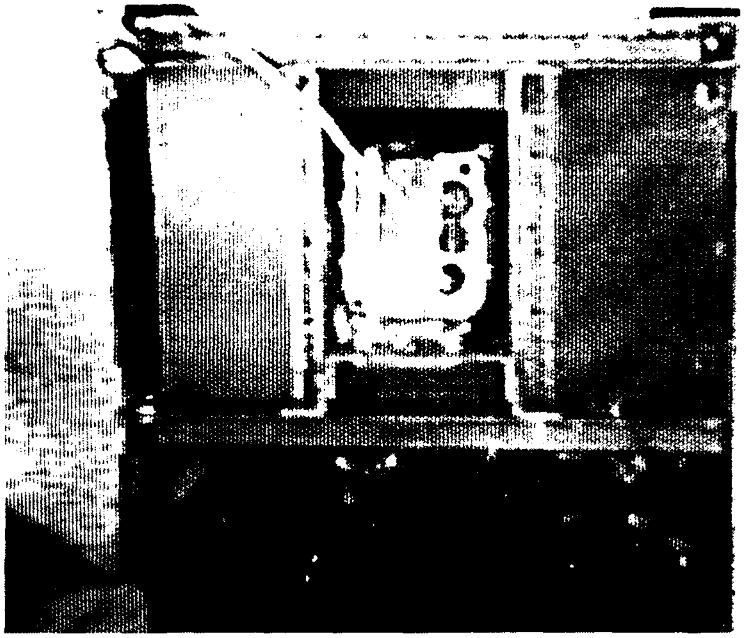

FIGURE 7. REMOTE COCKPIT CAMERA IN PLACE

FIGURE 8. COCKPIT CAMERA COVERAGE, APPROACHING IMPACT

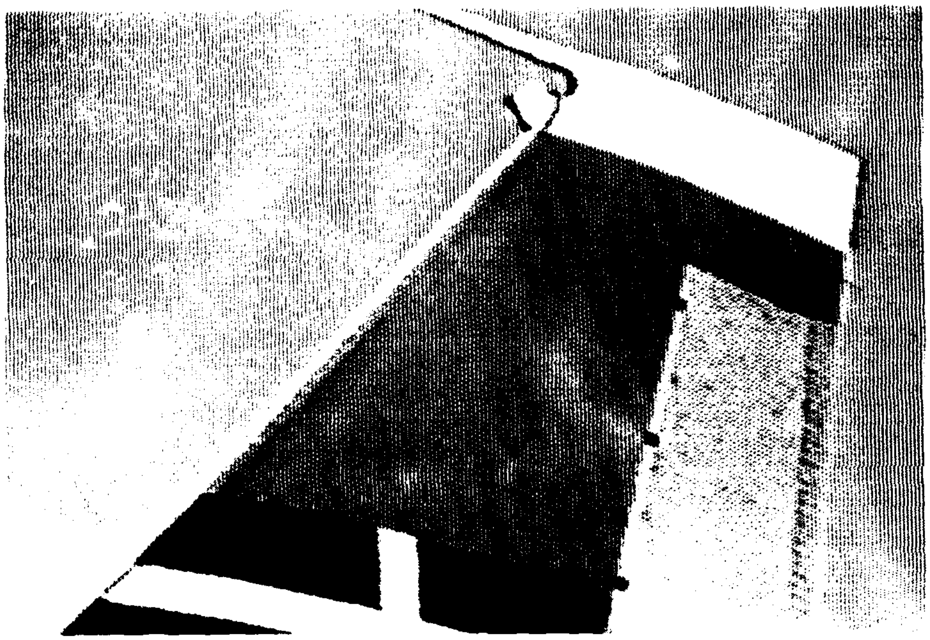

FIGURE 9. REMOTE TAIL CAMERA MOUNTED IN POSITION

FIGURE 10. IMPACT COVERAGE FROM TAIL CAMERA

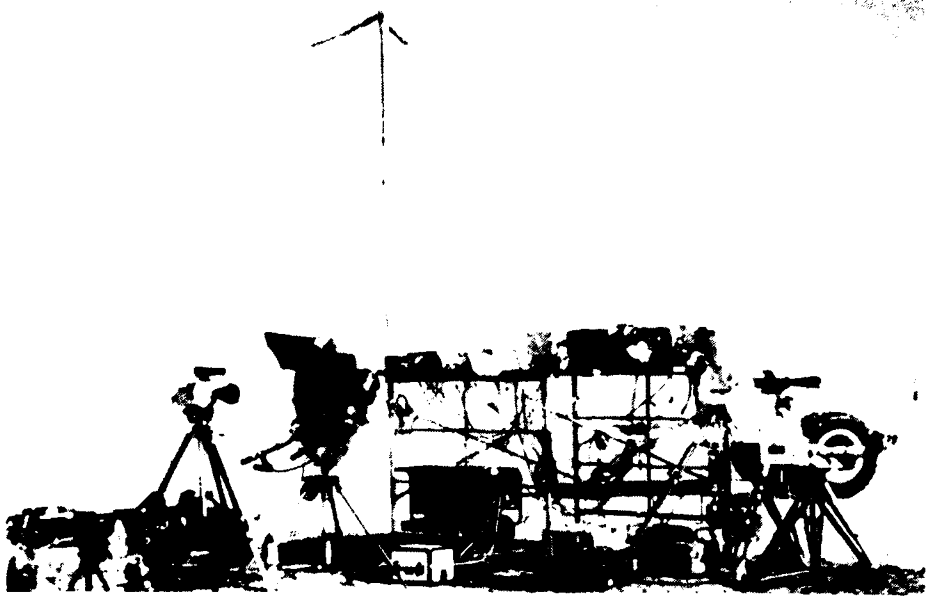

FIGURE 11. REMOTE CAMERA STATION #11 AT NORTH END OF IMPACT AREA

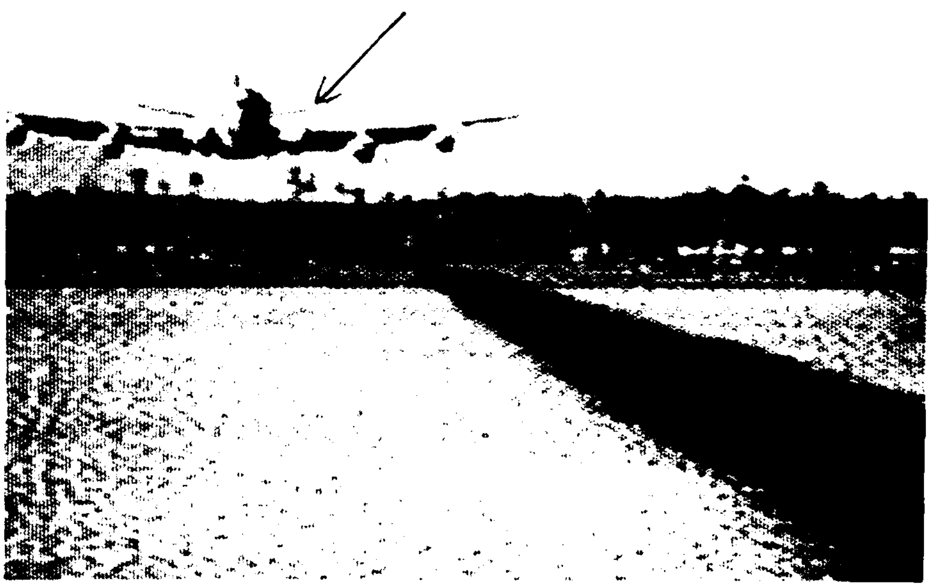

FIGURE 12. COVERAGE FROM STATION #11, MOMENTS BEFORE IMPACT LANDING LIGHTS (ARROW) AND ON-BOARD CAMERAS WERE TURNED ON AT THE SAME TIME IN THE SCHEDULE

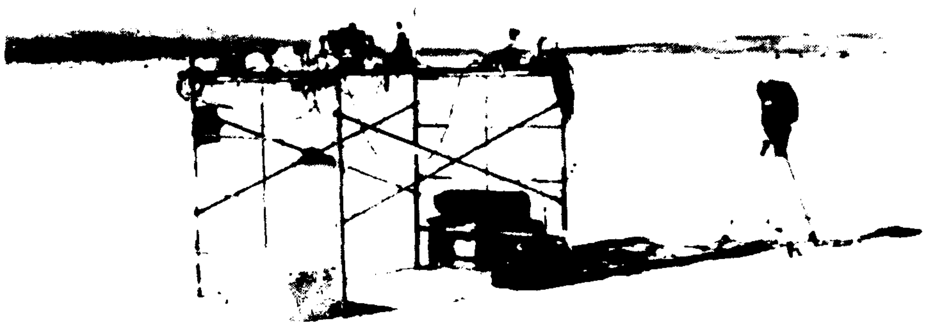

FIGURE 13. REMOTE CAMERA STATION #5 INCLUDING PAO CAMERAS

FIGURE 14. STATION #5 IMPACT COVERAGE

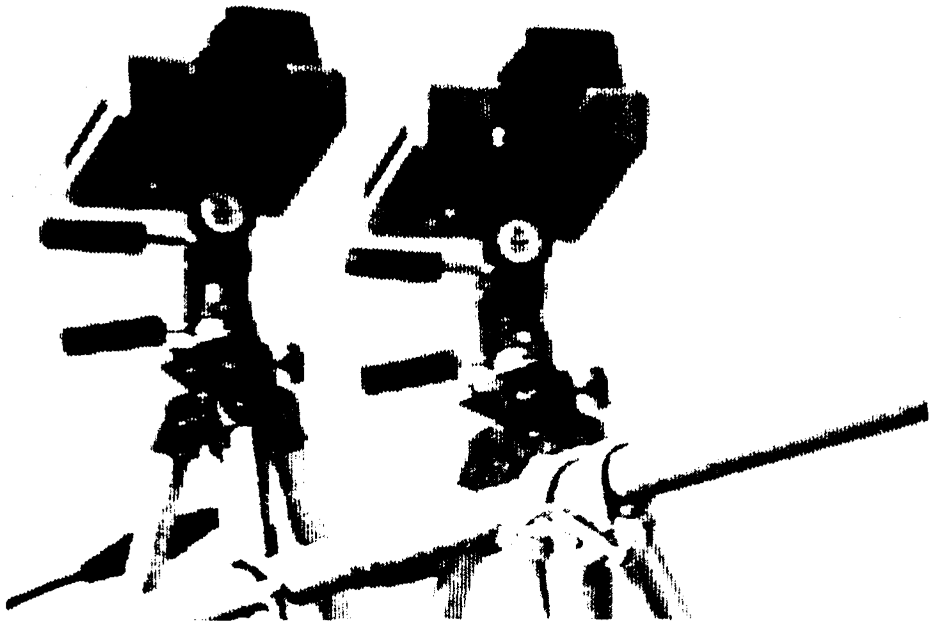

FIGURE 15. SPIN PHYSICS HIGH SPEED VIDEO SETUP AT REMOTE CAMERA STATION #21

FIGURE 16. SPIN PHYSICS VIDEO IMPACT COVERAGE

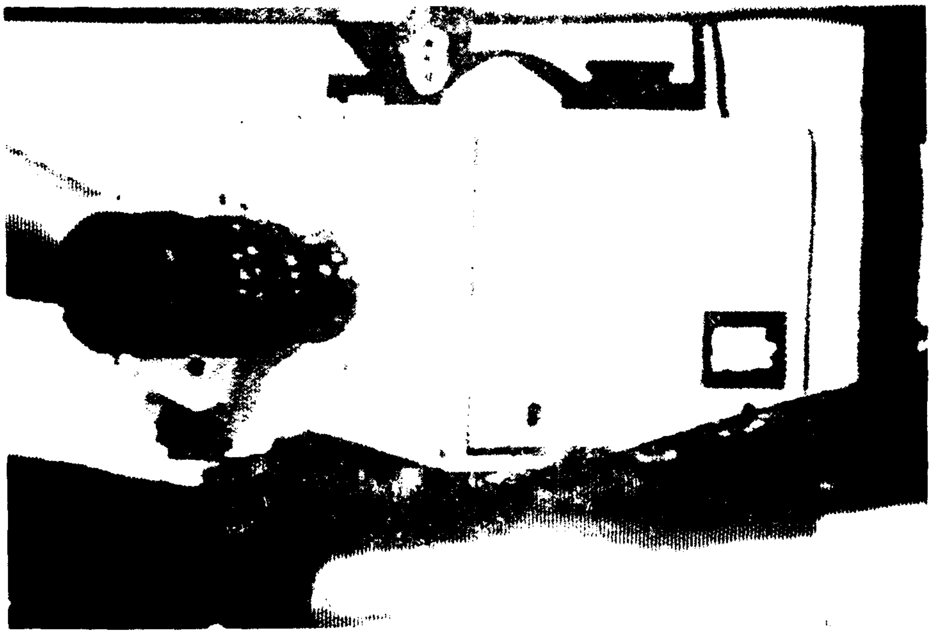

FIGURE 17. HIGH SPEED VIDEO CAMERA

FIGURE 18. OPERATOR AND REMOTE CONTROL DEVICE FOR CINE-SEXTANT MOUNT

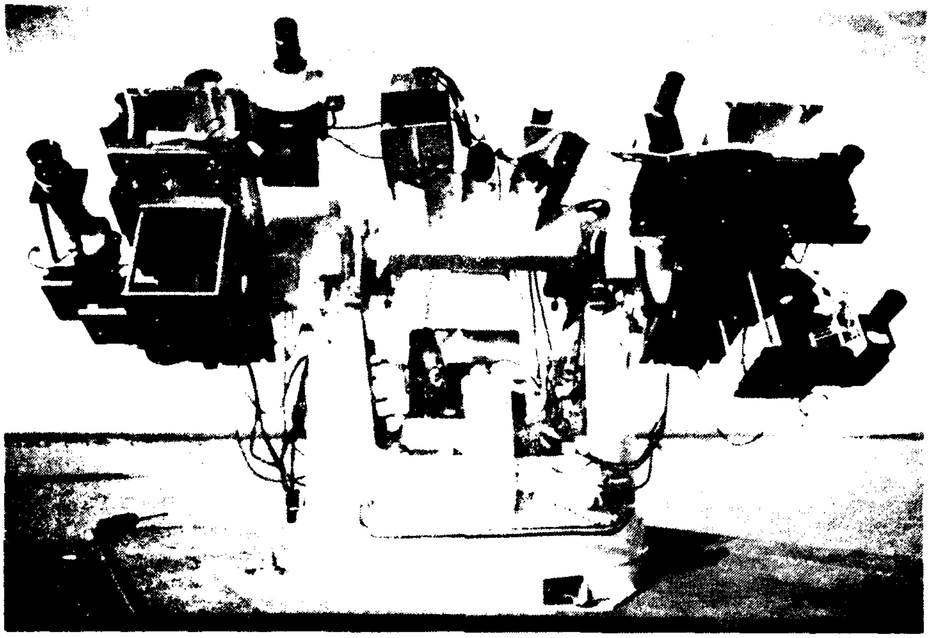

FIGURE 19. REMOTE CINE-SEXTANT TRACKER SETUP

FIGURE 20. CID ENGINE #3 IGNITION AS PHOTOGRAPHED BY REMOTE TRACKER

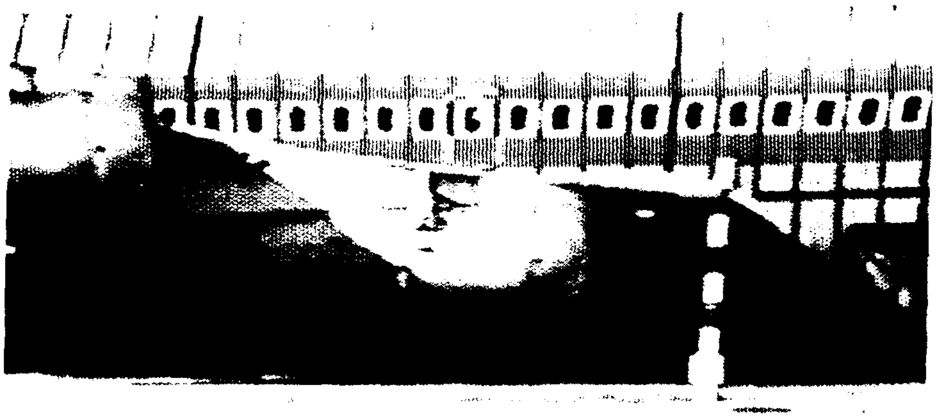

FIGURE 21. VIEW FROM REMOTE TRACKER SHOWING ENGINE #3 AND CALIBRATION POST

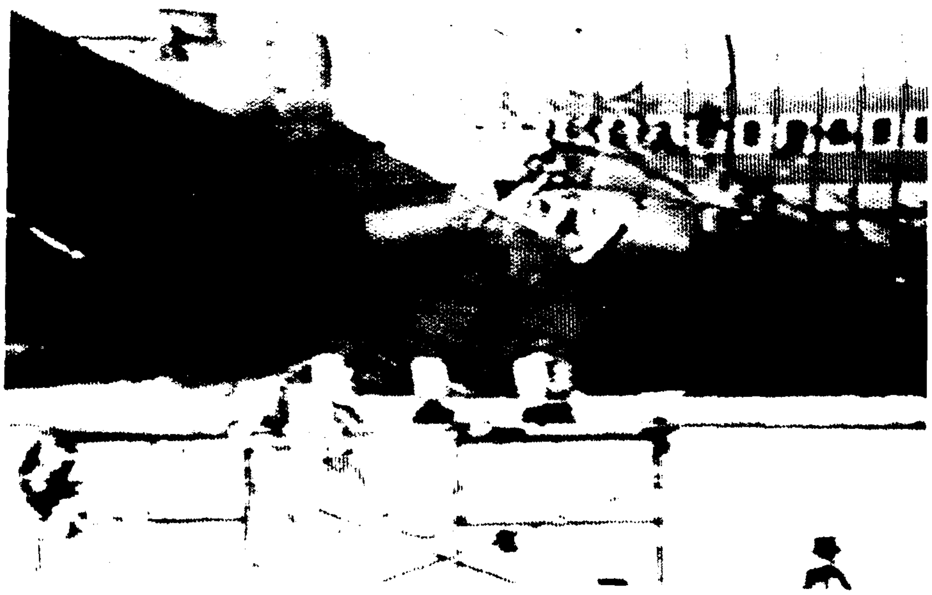

FIGURE 22. VIEW FROM REMOTE TRACKER SHOWING ENGINE #3 IGNITION AND REMOTE CAMERA STATION #18

FIGURE 23. SITE 17/22 MANNED CINE-SEXTANT TRACKING CREW

FIGURE 24. MANNED TRACKER COVERAGE (HIGH SPEED VIDEO WITH TIMING)

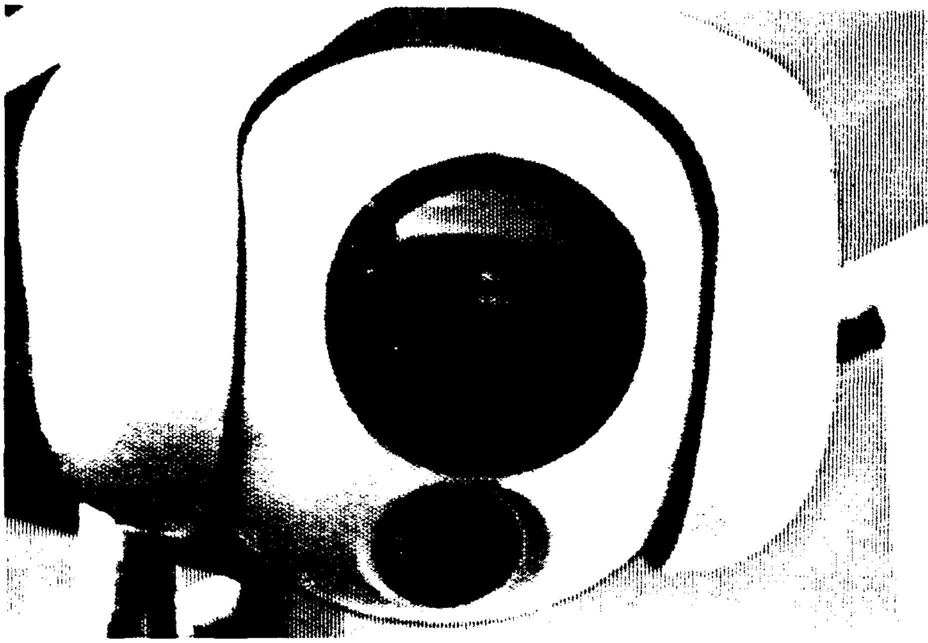

FIGURE 25. THERMOGRAPHY CAMERA (IR)

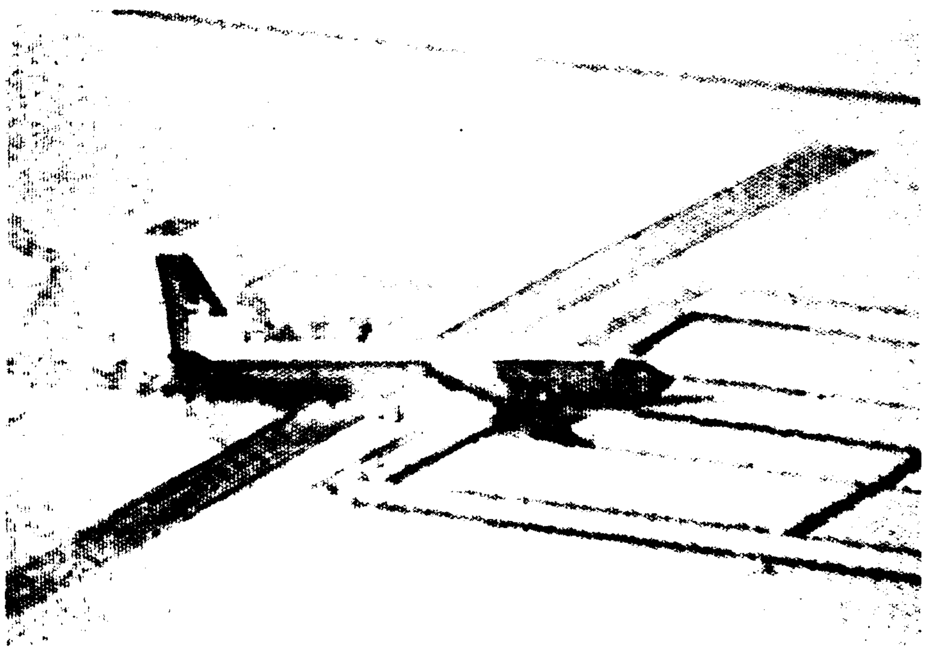

FIGURE 26. CAST GLANCE COVERAGE OF IMPACT

FIGURE 27. CAST GLANCE PHOTO AIRCRAFT: P-3 ORION

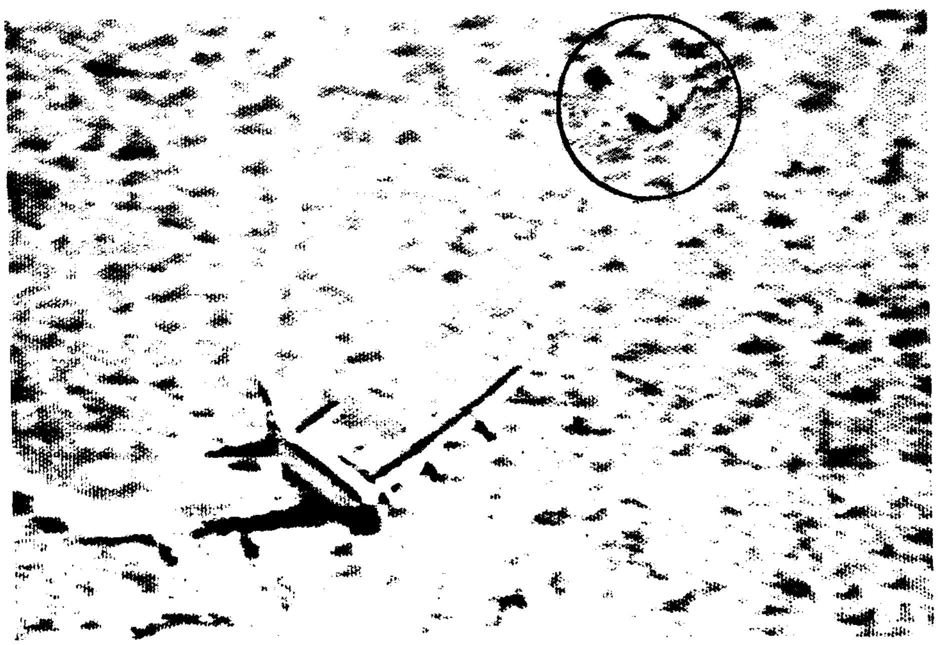

FIGURE 28. CID AIRCRAFT APPROACHING IMPACT AND CHASE PLANE (IN CIRCLE) (VIEW FROM CAST GLANCE)

FIGURE 29. STILL PHOTOGRAPHER DOCUMENTING FIREFIGHTERS CARRYING AN INJURED COMRADE

FIGURE 30. DOCUMENTARY MOTION PICTURE CAMERAPERSON ASSIGNED TO COVER FIREFIGHTING ACTIVITY

FIGURE 31. STILL PHOTOGRAPHER DOCUMENTING FIRE CREW

FIGURE 32. MOTION PICTURE CAMERAPERSON ASSIGNED TO COVER FIREFIGHTERS

4. DEMONSTRATION AND DELIVERABLES

4.1 IMPACT DAY DEMONSTRATION

The impact demonstration occurred on December 1, 1984, in accordance with the FAA/NASA ground operations plan (GOP), which specified and itemized the day of flight time line from the 3:30 a.m. crew reporting for work to the planned 0900 takeoff (T), the 0909 impact, and the 9:40 a.m. time for setting up rope and fencing to mark the perimeter of the crash wreckage.

Additional operations plans were made for site impact access control; personnel safety; security; fire/rescue personnel; impact area, vehicle, and personnel assignments; ground operations personnel/function/location/call sign; convoy operations/readiness checklist; aircraft/experiment safing team; runway complex/landing areas; radio call procedures; base map; how to get to CID crash site; radio call signs; communications block diagram; ground operations frequencies; convoy RF communications overview; convoy command vehicle; firefighters/rescue communications; NASA Dryden radio call signs; impact site - security control and access; 17/22 parking outline; topographical chart; CID security control points; CID impact flight profile and operational control area; fire department equipment deployment; event and time table CID post-impact ground operations; impact/slideout site diagram; photographic station locations; IOM "Recommendations for work space hazard identification CID post impact"; and tape-film-camera recovery list (Appendix AA).

4.2 JPL SUPPORT

The Jet Propulsion Laboratory support to CID on December 1st was logged, as events happened, by the JPL Photography Group recorder inside the NASA 25 ground operations control van (Figures 33 and 34). At four o'clock, NASA 25 was reported, logged, on site at the Runway 17 takeoff area. The director of photography operations (John D. Gregoire) initiated at 6:21 a.m. checks with the JPL photographic team; all personnel completed camera checks by 0652. At 0659, JPL personnel were departing the CID site; 0710, two vehicles with JPL personnel and one vehicle with Zybion personnel arrived at Runway 17/22 from the crash site. At 0715, all cameras were turned on; 0728, all photo ops personnel were leaving for the C-7 hill area; 0753, Photo 2 UHF radio is operational.

At 0818, 720 aircraft engines started; 0831, ground operations manager (GOM) queried, "Are you [Photo 1 (JPL)] ready to support the project?" Photo 1 response: "Yes, we are ready to support the project." At 0845, all JPL personnel to evacuate lakebed; 0847, GOM to Photo 1: "Stop late evac; there is a 10 minute delay." At 0855, GOM to Photo 1: "Egress from site." Photo 1: "Turn on cameras and evacuate site." 0900, NASA 25 van changed position. 0906, JPL on-board cameras in nose, tail, and cockpit started. 0907, aircraft door closed; 0910, call to hold for unauthorized personnel; 0912, aircraft chocks removed; 0914, takeoff.

0917, NASA 25 in place. At 0922, aircraft impact, nose turned west; 0926, NASA 25 to site (Figure 35; 0928, Photo 1: "All photo personnel continue

with filming for fire coverage," (A/C still burning); 0945, ambulance to site. 1005, plane still burning. 1020, permission to stop camera systems. 1051, Photo 5: "P-3 Orion aircraft at NASA." (See Appendix BB.)

4.3 FILM RECOVERY AND PROCESSING

After the fire was extinguished, the first step by the aircraft/experiments safing (AES) team was the delethalization of the aircraft and impact area, which involved removing fuel puddles, trapped fuel in the aircraft, turning off and disconnecting batteries, deflating tires, and discharging high pressure bottles. The JPL video/photo documentation director and the JPL tape, film, and experiments recovery (TFER) team removed the nose, cockpit, and tail cameras film. Exposed film from motion picture cameras were unloaded, logged, canned, and labelled (Figure 36) identifying the station, camera number, and name of unloader. Video tapes unloaded from video recorders were boxed and both the cartridge and box labelled. Still film was unloaded, labelled with station and camera number, and bagged.

All exposed and recorded material was collected and hand delivered by a guard to the JPL photography film vault in Building 111. On Monday, December 3, 1984, the exposed motion picture film was separated and delivered by special drivers to the Hollywood Film Enterprise Co. in Hollywood, CA, and to Foto-Kem Co. in Burbank, CA. After processing, the original negative was hand carried to Foto-Tronics Co. in Burbank and placed on their Rank-Centel Telecine printer. The CID photography editorial team of two FAA and two JPL representatives, worked with the Foto-Tronics Rank printer operator to correctly select, assemble, and transfer the original film to a one-inch video tape master. The footage was transferred in numerical order with identification slates preceding each new roll, indicating station/camera number.

The original video tape was also "mastered" just like the motion picture footage, but identified as being original video tape - not film. All original video was transferred to a three-fourths inch master by the CID photo editorial team, which was then hand carried to the FAA Technical Center, Atlantic City, NJ, by one of its staff members. The completed one-inch video tape master is stored at the FAA's contractor's laboratory. Four three-quarters inch sets of copies of the master tape were struck, for use in editing and viewing. The original film went back to Foto-Kem, where it was broken down into reels and filed under station and camera number. Each reel is now considered as a separate piece of film. Interested personnel, investigators, and organizations may order footage by viewing the working copy of the composite video tape and then selecting desired scenes by slated station/camera number. A master interpositive has been made of selected rolls and an internegative and work print has been produced from this. The original film, the interpositive, and the internegative are stored in the vault of the FAA contractor.

4.4 DELIVERABLES

JPL delivered, as a fulfillment of its contract (JPL-FAA Interagency

Agreement Number DTFA03-80-A-00215, Modification 11, Task 13, Attachment L), seven thousand feet of 35-mm original motion picture negative film and a thousand feet each of 35-mm interpositive and internegative film; 22,300 feet of 16-mm original motion picture negative film and 2,983 feet each of 16-mm interpositive and internegative film; and 14,100 feet of 16-mm color work print. Overall total footage delivered is 53,365 feet.

The still photography negatives and prints delivered to FAA were as follows: 1,094 frames 70-mm original negatives; 7,756 5 x 5-inch color prints; 1,580 8 x 10-inch color prints; 282 11 x 14-inch color prints; eight 16 x 10-inch color prints, 115 8 x 10-inch viewgraphs, and 813 35-mm color slides. Overall total is 11,658 pieces.

In addition, the JPL Photography Group delivered eight hours of one-inch video masters, 24 hours of three-quarters-inch video masters, and 36 hours of three-quarters-inch duplicate tapes from the masters. Overall total is 68 hours.

4.5 CATALOG OF FILMS, TAPE, AND STILLS

A catalog of film, tape, and stills has been prepared by JPL identifying and specifying the station location and camera number, camera make, lens size, film rate frame per second, film type, and footage for film to internegative and positive, film to tape, tape to tape, and stills. A diagram of the camera stations locations at the controlled impact demonstration site shows Stations 2 to 10 and 21 west of the impact area; Stations 12 to 20 and 22 east of the site; Stations 1 and 11 south and north, respectively, of the impact area; and Site 17/22 3.2 miles northwest and Station C7 6.0 miles northeasterly of the impact area.

In the catalog of the film to internegative and positive, the on-board cabin, nose, and tail camera footage are indicated, together with the P-3 Orion aircraft Cast Glance footage. The film to tape Tape 1 is for Stations 1 to 11; Tape 2, Stations 11 to 21; Tape 3, Station 22 and Site 17/22; and Tape 4, Station 22, Site 17/22, the on-board cabin, nose, and tail footage, and the Cast Glance footage. The tape to tape catalog for Tapes 1 and 2 of 4 indicates footage from the fire station to the crash, fire fighting, interiors, and post crash long shots. Tape 3 of 4 is footage of the second evacuation audio and crash, takeoff to crash (tracking), crash only, and masters from the Norelco station, Nagy, Xybion, TriTronics, Spin Physics, and Inframetrics and Flar infrared stations. Tape 4 of 4 is Cast Glance footage from the front and aft mounts.

The catalog of still photography lists frames printed from the NASA and Army helicopters aerial coverage, and remote ground coverage using the Hulcher cameras from Stations 4, 11, 16, 18, 19, and 22. Frames from the remote cine-sextant tracker at Station 22 are also listed. Crash and burn sequence frames, NASA helicopter hand-held stills, and the post crash documentation still frames are in the catalog. (See Appendix U/11-21.)

FIGURE 33. INTERIOR OF NASA 25 GROUND OPERATIONS AND PHOTOGRAPHIC OPERATIONS CONTROL CENTER

FIGURE 34. CID CONTROL ROOM ACTIVITIES

FIGURE 35. GROUND OPERATIONS VEHICLE NASA 25 LEADING POST IMPACT CARAVAN FROM SITE 17/22 TO IMPACT AREA (VIEW FROM CHASE PLANE)

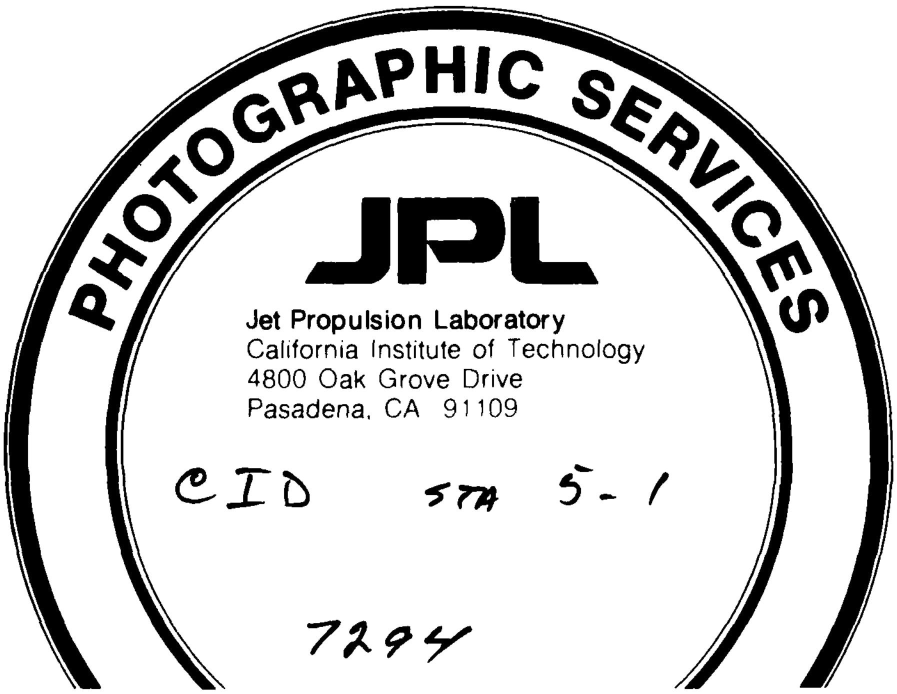

FIGURE 36. JPL PHOTO LAB IDENTIFICATION LABEL FOR MOTION PICTURE FILM AND PRINTS

5. SUMMARY

5.1 FLIGHT SCENARIO

The four-engine Boeing 720B aircraft was loaded with 76,258 lbs of antimisting kerosene, known as AMK. The left (port) and right (starboard) outboard and reserve tanks were equally filled with AMK. The center wing tank contained 11,658 lbs of AMK. The right inboard main tank had 14,392 lbs; the port inboard tank had 160 lbs more. (Reference 1.)

5.2 LAST FLIGHT COUNTDOWN

The scheduled takeoff time for CID Flight 015 - its last and only flight to be flown without anyone on-board - was announced as zero nine hundred hours.

The countdown began in darkness at zero four hundred hours. The aircraft CID system was preflighted on time at 0430, fuel sampled at 0500, and flight engineering preflighted at 0530. At 6:40 a.m., wait, i.e., hold, for 45 minutes for the decision on the weather. At 0725, all stations were called and the telemetry turned on. Mission flight cards were started at 7:34:54. The C-band beacon checked at 0800. Engines started at 0816. Videos were turned on at 0830. The chase aircraft took off for the CID site check at 0835. The preflight crew egressed at 0859. Standby hold at 9:01.06 because survival school personnel were lingering in the impact area. At 9:06:32 the crew egress was completed. Hold at 9:08:18 to wait until the ABC television crew exited the area. The nose gear chock was removed at 9:10:20. Brakes released at 9:13:12. Rotation at 9:14:21.5. (Reference 1.)

5.3 THE FLIGHT

The aircraft lifted off at 9:14:50. (JPL photo instrument coverage started, see Figure 37.) It was remotely flown from lakebed Runway 17 to approximately 2,300 feet above the ground into a race track pattern above the impact/slideout site (Figure 38). A northerly descent was started to allow the airplane to impact the ground just prior to the gravel slideout area. The intent was for the airplane to slide into cutters, which would rupture the wing fuel tanks and create a spillage.

The aircraft was remotely controlled from the ground by a crew consisting of pilot, flight test engineer, and ground cockpit engineering supervisor (Figure 39.) Full-sized anthropomorphic mannequins were inside seat-belted to test occupant and cabin restraint mechanisms, systems, and materials.

Turning the plane on final approach, the impact target area and the lead-in line on the ground could be seen on the television screen; but the TV contrast was low and the picture was not as clear as on some prior test flights. As the glide slope was intercepted, the aircraft pitch attitude was adjusted to place the TV boresight X on the orange panel of the target area fence. Instead of holding the glide slope, the airplane drifted low and had to

be flown back up to the glide path. The airplane drifted slightly right of the center line and a correction to the left was made by the pilot on the ground (Figure 40). When the plane passed the 200-ft altitude, it was still slightly right of center and a go-around was considered. The flight continued. The flight test engineer activated the remotely controlled instrumentation on the plane at 150-ft altitude. At about 100 feet, a fairly sharp left lateral control command was initiated to move the plane closer to the centerline. The left roll command generated a lateral oscillation, which did not have time to damp prior to ground contact. Depth perception through the TV was poor and it was difficult to accurately judge the touchdown.

The left wing and engine #1 touched first at 9:22:10.97 (Figure 41). The main fuselage contact was at 9:22:10.99. The left wing contact resulted in a yaw to the left as the airplane slid through the vertical target fence. The right inboard engine (#3) struck the wing opener at 9:22:13-14. The aircraft continued to slide, coming to rest at 1,385 feet from the initial impact point, 250 feet left of center, and about 50-60 degrees counterclockwise of the longitudinal center line. A fireball (of "short duration ") erupted after the aircraft struck the wing openers. The fuselage fire was brought under control by Edwards Air Force Base fire fighters and the contingency response force (CRF) about 11:30 a.m. to 12 noon. Total flight time from initial roll to impact was 8 min. 51 sec. (Reference 1.)

5.4 JPL COVERAGE

The CID engineering ground and airborne photographic/video coverage documentation was made available to the NASA-A/DFRF public affairs office (PAO) through the FAA/JPL efforts. Selected impact site still films were available for print dissemination. The JPL airborne and ground video tapes were processed and edited copies made available as soon as possible after the impact for news media use (Figures 42 to 44). The high speed motion picture films were also made available by JPL to the investigator in charge (IIC), the investigation experiment team (IET), and documentation research team (DRT).

FIGURE 37. JPL INSTRUMENTATION COVERAGE STARTED WITH CID TEST PLANE TAKING OFF

FIGURE 37-A. ANTHROPOMORPHIC MANNEQUINS IN EXPERIMENTAL SEATS (MEDIUM SHOT PHOTO)

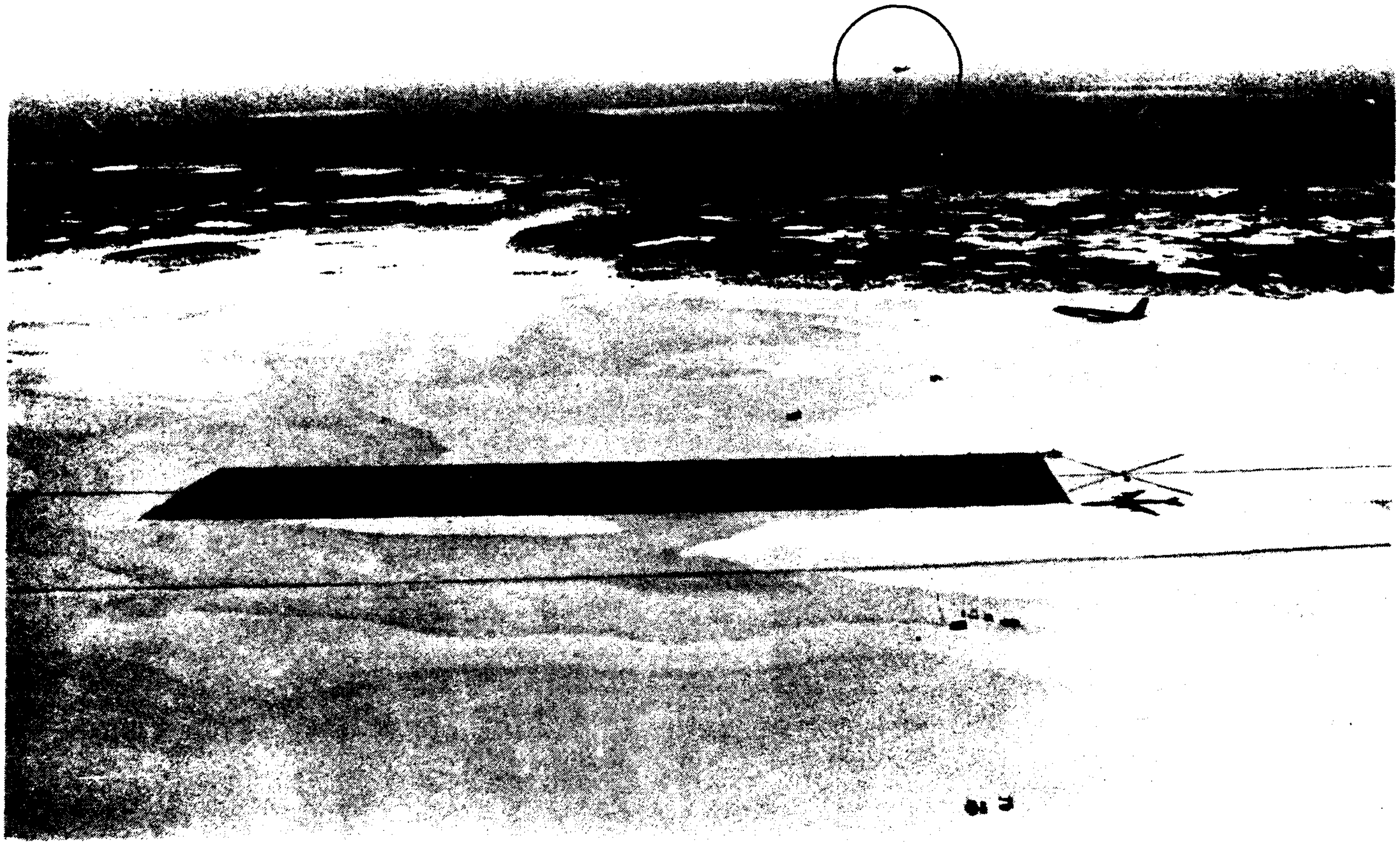

FIGURE 38. AERIAL VIEW OF BOEING 720B TEST AREA (SHADOW PRODUCED BY AIRCRAFT PROVIDES THE VIEWER WITH A TRUE SIZE PERSPECTIVE OF THE CRASH SITE) AND PHOTO HELICOPTER (IN CIRCLE)

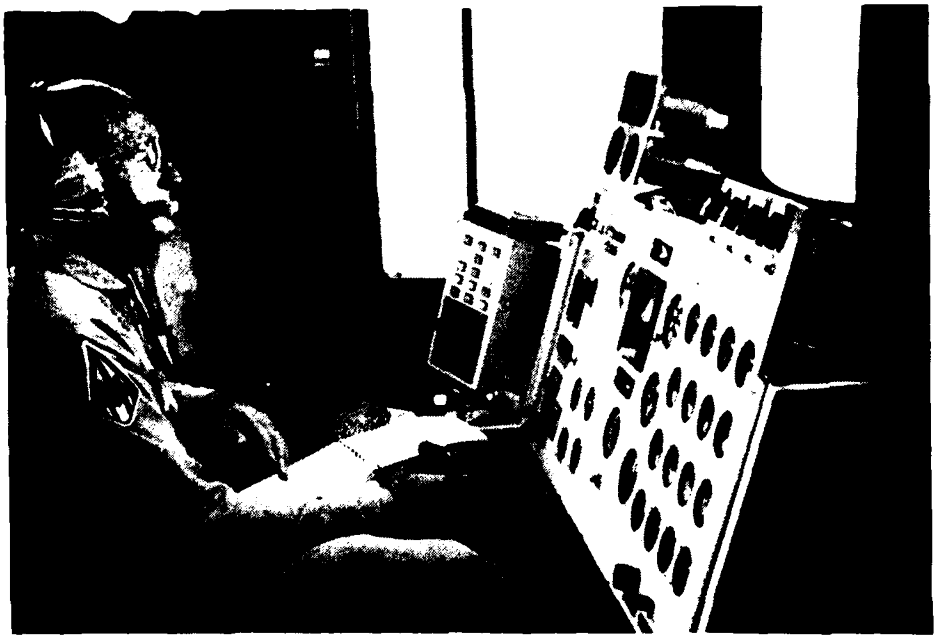

FIGURE 39. AEROSPACE RESEARCH PILOT FITZHUGH L. FULTON REMOTELY GUIDING CID AIRCRAFT

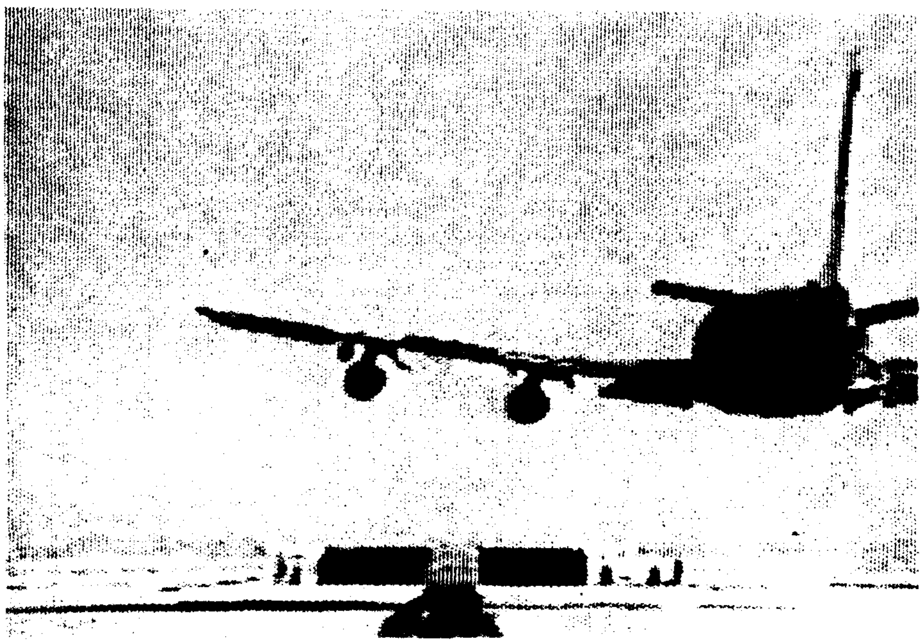

FIGURE 40. CID AIRCRAFT APPROACHING IMPACT AS SEEN FROM CAMERA STATION #1

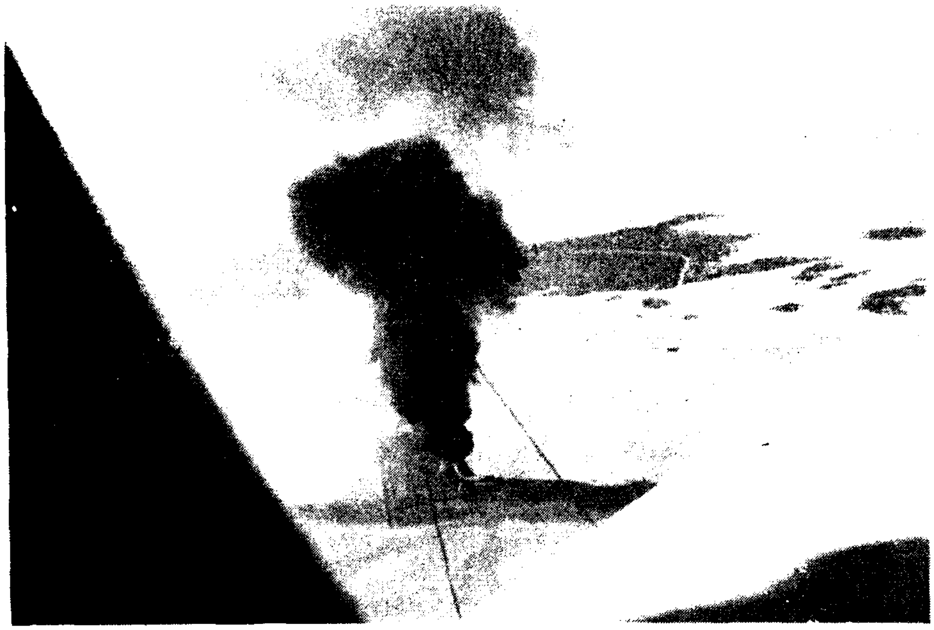

FIGURE 41. CID AIRCRAFT AT IMPACT AS SEEN FROM CHASE PLANE

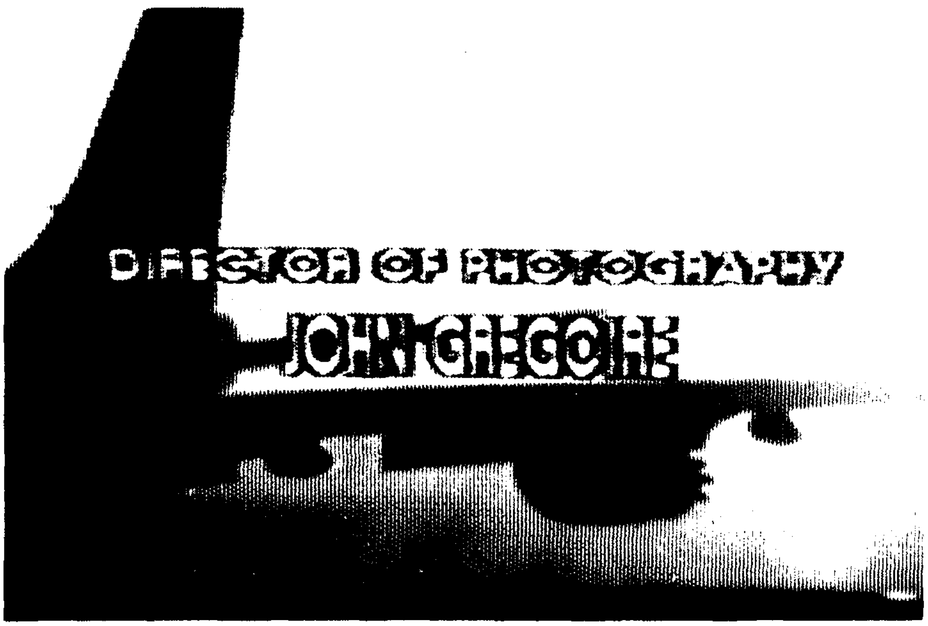

FIGURE 42. CREDIT - DIRECTOR OF PHOTOGRAPHY, JOHN GREGOIRE

FIGURE 43. TITLE CARD FROM C.I.D. CONTROLLED IMPACT DEMONSTRATION FILM

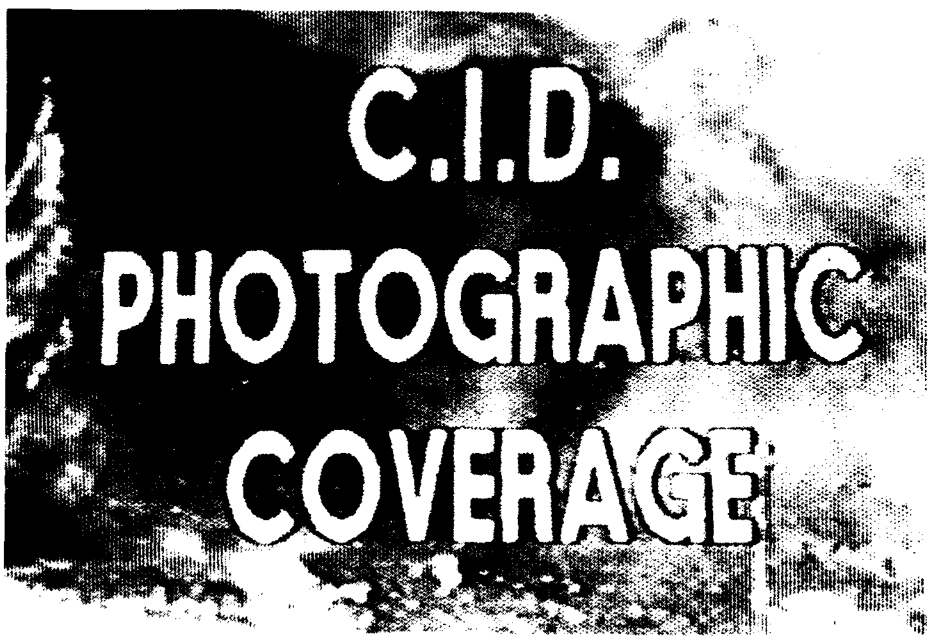

FIGURE 44. TITLE CARD FROM C.I.D. PHOTOGRAPHIC COVERAGE *DOCUMENTARY*

GLOSSARY

ABBREVIATIONS AND ACRONYMS USED IN REPORT

A	Ames Research Center (NASA)
A/C	aircraft
A/DFRF	Ames-Dryden Flight Research Facility
A/G	air to ground
AES	aircraft/experiments safing
AFFTC	Air Force Flight Test Center
AMK	antimisting kerosene
AOK	all OK
APVS	airborne photographic/video system
C.U.	close up
CC	convoy commander
CFR	crash, fire, rescue
CID	controlled impact demonstration
CP	cherry picker
CRF	contingency response force
CVR	cockpit voice recorder
DAS	data acquisition system
DFDR	digital flight data recorder
DFRC	Hugh L. Dryden Flight Research Center
DFRF	Dryden Flight Research Facility
DNSWC	Dahlgren Naval Surface Weapons Center
DOD	Department of Defense
DOT	Department of Transportation
DRT	documentation research team
E.C.U.	extreme close up
EAFB	Edwards Air Force Base
ETS	Edwards Test Station
EVAC	evacuation
FAA	Federal Aviation Administration
FAATC	FAA Technical Center
FCS	flight control system
FDR	flight data recorder
FIR	flight incident recorder

FM	frequency modulation
FM-9	proprietary high molecular weight polymer developed by ICI
fps	frame per second
GE	General Electric Company
GOM	ground operations manager
GOP	ground operations plan
GPVS	ground photographic/video system
GSE	ground support equipment
HVS	high speed video
I	impact
ICI	Imperial Chemical Industries, Americas, Inc.
IET	investigation experiment team
IIC	investigator in charge
IOM	interoffice memorandum
IR	infrared
IRIG	inter range instrument ground
ISD	impact site documentation
JPL	Jet Propulsion Laboratory
L.S.	long shot
LaRC	Langley Research Center
M	Milliken camera
M.C.U.	medium close up
M.S.	medium shot
NASA	National Aeronautics and Space Administration
NATC	Naval Air Test Center
NSWC	Naval Surface Weapons Center (Dahlgren)
NTSB	National Transportation Safety Board
PAO	public affairs office
PM	program manager
PMPMTC	Point Mugu Pacific Missile Test Center
POV	privately owned vehicle
PST	Pacific standard time
R&D	research and development
RF	radio frequency
RPV	remotely piloted vehicle
S	still camera

T	takeoff
TCS	tracking camera system
TFER	tape, film, and experiments recovery team
TM	trademark
TV	television
UHF	ultra high frequency
USAF	United States Air Force
VAFB	Vandenberg Air Force Base
VHF	very high frequency
VIP	very important person

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APPENDIX A

Full-Scale Transport
Controlled Impact
Demonstration Program

PHOTOGRAPHIC/VIDEO COVERAGE PLAN

MARCH 1984

Full-Scale Transport Controlled Impact Demonstration Program

Federal Aviation Administration

National Aeronautics and Space Administration

PHOTOGRAPHIC/VIDEO COVERAGE PLAN

MARCH 1984

U.S. Department of Transportation
Federal Aviation Administration
Technical Center
Atlantic City Airport, N.J. 08405

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FOREWORD

The Photographic/Video Coverage Plan is prepared as an operational supporting document to the program Management Plan (DOT/FAA/CT-82-151). This plan, prepared from inputs provided by the Federal Aviation Administration Technical Center, National Aeronautics and Space Administration-Langley Research Center, and Jet Propulsion Laboratory identifies the Controlled Impact Demonstration (CID) program/experiment(s) requirements and needs; and describes a photographic/video coverage plan in response to those requirements and needs.

Final agreements and decisions will not be unilateral. The requirements, needs, and proposed supporting plans are primary to the CID program. All participating parties must review and coordinate the plan, and all final arrangements for successful data acqusition for the program must be agreed to.

FULL-SCALE TRANSPORT CONTROLLED IMPACT DEMONSTRATION PROGRAM

PHOTOGRAPHIC/VIDEO COVERAGE PLAN

1.0 INTRODUCTION

This plan is in support of the Full-Scale Transport Controlled Impact Demonstration (CID) Program Management Plan (DOT/FAA/CT-82-151) dated January 1984 as approved by the Federal Aviation Administration (FAA) and National Aeronautics and Space Administration (NASA). The photographic/video coverage requirements are in support of the CID program experiments.

- Demonstration of antimisting kerosene (AMK) performance.
- Structural (fuselage, wing) measurements.
- Occupant and cabin restraint systems.
- Cabin fire safety.
- Digital flight data recorders/cockpit voice recorders (DFDR/CVR).

The management plan generally defines the program/experiment objectives and provides for a technical discussion of each experiment. The following sections identify the program/experiment requirements and needs.

2.0 CID PROGRAM REQUIREMENTS/NEEDS

The CID program will develop:

a. A total motion/still film and video documentation of the aircraft experiments, installation/integration, flight operations, and controlled impact demonstration.

b. Ground cameras must document all and/or the appropriate portions of the total flight profile and impact scenario through slideout deceleration to a stop.

c. Airborne cameras must document all and/or the appropriate portions of the total flight profile and impact scenario through slideout deceleration to a stop.

3.0 CID EXPERIMENT(S) REQUIREMENTS/NEEDS

3.1 Antimisting Kerosene (AMK)

The FAA Technical Center's antimisting kerosene (AMK) research efforts have included numerous analyses, laboratory investigations, reduced scale and full-scale tests, and RB-66/SP2A/A3D aircraft surface-to-surface tests. The CID is a final culmination of the total research investigations and tests in an air-to-surface impact demonstration.

The FAA experience gained through the reduced scale, full-scale, and the RB-66/SP2A/A3D tests are the basis for which the photographic/video coverage requirements and needs stem. Motion and still photography/video are the primary measurement means or tools which document for demonstration and engineering analysis the performance of the AMK.

Therefore, the selection of cameras, lens, film speed, frame rate, and location (manned/unmanned), must complement the following requirements/needs:

a. Ground cameras must document all and/or the appropriate portions of the total flight profile, impact scenario, through slideout, deceleration to a stop.

b. Camera coverage is required on both sides of the impact site/runway heading from prior to impact, during slideout, and deceleration to a stop.

c. Camera coverage is required at both ends of the runway impact/ slideout site.

d. Photographic coverage of the aircraft from initial impact to the ground and/or initial impact to the wing obstructions through slideout to a minimum of 100 knots necessary to produce the following:

- Detailed high speed continuous tracking using high resolution color film for digital image enhancement analysis of:
  - -- Airborne fuel mist cloud from wing release point to at least 300 feet aft.
  - -- Development of fireball(s) from the wing back aft to at least 300 feet.
  - -- Ignition source verificaton.

- Detailed film verification of ignition source(s) from both sides of impact centerline.

- High speed still photography using high resolution color film.

- A full frame, high resolution detail of:
  - -- The wing fuel release point(s).
  - -- Obstruction(s) impact.
  - -- Engine separation(s).
  - -- Slideout time/distance to/from obstructions.

e. Continuous photographic coverage of aircraft from approximately 10 seconds prior to initial impact through slideout up to a minimum of 5 minutes after rest to produce the following:

- Overall, clear, color high resolution from an elevated position (airborne) abreast the aircraft with a minimum 500 feet field of view (from nose of aircraft aft).

- Overall, clear, color high resolution film from a ground level position abreast of the planned impact with continuous aircraft motion tracking into high speed/standard video tape and 16 mm high speed film formats.

f. High speed film coverage from aircraft vertical stabilizer viewing forward (Attachment I) from time of initial impact through slideout.

g. Range time is required on all film and video for correlation with all airborne and ground data acquisition.

3.2 Structural (Fuselage, Wing)

Both the FAA and NASA have ongoing crashworthiness/crash behavior research activities which include analytical model development, static and dynamic section tests, full-scale aircraft drop tests, and comprehensive load definition and structural failure evaluations. The CID is a benchmark metal crash data acquisition effort to support composite crash dynamics programs by both organizations.

The CID structural experiment will involve a measure of fuselage/wing deformation obtained from both onboard accelerometer/strain gage instrumentation, and motion and still photography/video instrumentation located externally at the impact site. Photo time coding will be put on the film for purposes of correlating the deformation effects between onboard instrumentation and ground-based coverage of aircraft grid locations (see Attachment A). To accommodate this effort, the selection of ground cameras, lens, speed, location, etc., must meet compliance with the following requirements/ needs:

a. Ground cameras must document all and/or the appropriate portions of the total flight profile, impact scenario, through slideout, deceleration to a stop.

b. Camera coverage is required on both sides of the impact runway heading from prior to impact, slideout, and stop.

c. Camera coverage is required at both ends of the runway impact/ slideout site.

d. Motion and still photographic/video instrumentation coverage, speed, and resolution must be of quality and quantity to measure:

- Aircraft attitude and position ground grids.
- True airspeed at impact - data base.
- Time and duration of impact - data base.
- Static and continuous tracking of initial and secondary structural deformation, with high resolution of aircraft grids; i.e., fuselage/wing bending, crush, rupture, etc.
- Crushing of fuselage structure of impact point.
- Starting of any fuselage rupture, wing failure, engine separation, etc.
- Full-frame resolution.
- Engine separation.

e. Continuous photographic coverage of aircraft from approximately 10 seconds prior to initial impact thrugh slideout up to a minimum of 5 minutes after rest to produce the following:

- Overall, clear, color high resolution from an elevated position (airborne) abreast the aircraft with a minimum of 500 feet (from nose of aircraft aft).
- Overall, clear, color high resolution film from a ground level position abreast of the planned impact with continuous aircraft motion tracking into high speed/standard video tape and 16 mm speed film formats.

f. High speed film coverage from aircraft vertical stabilizer viewing forward (Attachment I) from time of nitial impact through slideout.

g. Range time is required on all film and video for correlation with all airborne and ground data acquisition.

3.3 Occupant and Cabin Restraint Systems

Primary measurements are onboard aircraft accelerometers and photographic systems which will be correlated with the structural ground photographic/video coverage data.

3.4 Cabin Requirements

Post-impact/slideout stills and motion picture coverage of cabin. The NASA-Langley Research Center onboard high speed camera/lighting system fulfills basic engineering requirements in the cabin during impact/slideout. However, a requirement exists for a single position high speed video coverage showing an overall view looking aft. A real time downlink video coverage of the cabin lighting status for a go/no-go decision.

3.5 DFDR/CVR

The motion and still photographic/video coverage of Sections 3.1 and 3.2 should adequately provide the necessary coverage.

As the U.S. Navy/Naval Air Test Center (NATC) deployable flight incidence recorder is mounted on the starboard side of the dorsal fin and will eject in a starboard direction, the trajectory of the aerodynamic package may be adequately covered in the above sections requirements. A review is necessary to assure reasonable coverage. A tracking camera dedicated to the airborne recorder may be required.

4.0 PHOTOGRAPHIC PLANS

Introduction. The following plan is in support of the photographic requirements stated in the above Sections 2.0 and 3.0 for ground and airborne engineering photographic/video coverage (see Attachments B, C, D, E, and F for camera support schematic). The general plan is to photograph the test 8-10 seconds prior to impact, through the entire slideout, and until the fuselage has come to rest. Selected situations (Section 7.0) require coverage beyond the indicated times.

4.1 CID Overall Program Requirements/Needs

The Ground Photographic Task Unit based on the above (Section 2.0) as developed for the CID program:

a. The coverage of the CID program from installation/integration through a'rcraft experimentation, to final operation and impact, will be recorded with state-of-the-art motion picture still, video, and I.R. cameras. A high speed cockpit camera will be installed to cover a one-third horizon through the pilot windshield (see Attachment G). A radome nose camera will be installed to document a panoramic forward field of view (see Attachment M).

b. Instrumentation and documentation cameras will be of sufficient variety and placement to cover in close-up, medium, and wide angle views all appropriate portions of the total flight profile, from takeoff to impact through slideout to deceleration to a stop.

c. Coverage of the total profile, impact, through slideout deceleration to a stop will be provided by two manned airborne (helicopter) platforms.

d. The basic environmental factor of geographic location, angle of sunlight, distance from camera to subject, atmospheric effects (heat, mirage, aerial refractions, etc.), must be considered.

e. Radio communcations between the camera team, unit manager, and appropriate CID personnel is essential.

4.2 CID Experiment(s) Requirements/Needs

AMK. The AMK experiment photographic plans based on the requirement of Section 3.1.

a. See General Ground Photography Plan (Attachments B, C, D, E, and F). To cover impact scenario through slideout deceleration, we will employ:

- 24 Milliken - 400 feet per second (fps)
- 4 Fastax - 2000 fps
- 2 Documentation Video
- 2 High Speed (H/S) Video Systems
- 2 Infra-Red (IR) Systems
- 2 Documentation (W/P)
- 4 Sequence Still Cameras

b. High speed cameras - range, fixed position (see Attachments B and C).

c. Two high speed cameras - See General Ground Plan (Attachment C) for exact location. Flight profile will predict distance of slideout, etc.

d. High speed Fastax - Milliken type, from fixed position. Photographic coverage from impact through slideout and stop will be covered in two ways: Manned trackers running multiple cameras will record the entire event nonstop from prior to impact to after deceleration to a stop; stationary cameras will only record specific areas of the event.

- High speed multi-camera continuous tracking from both sides and ends manned tracking through slideout below 100 knots, using high resolution color film for image enhancement.
  - -- A multi-camera continuous coverage tracking system. Close-ups of mist forming at tank rupture(s).
  - -- Manned trackers, air platform, fixed camera positions (see Attachments B, C, D, E, and F).
  - -- Infrared camera recording systems; reference AMK ignition source verification plus stationary cameras.

- Inframetrics IR camera systems. Film rate and speed for stop action verification.

- Nikon motor driven 35 mm cameras. Photosonics high speed 35 mm. Holchure 70 mm sequence cameras (see Photographic Plan schematics, Attachment D).

- Specific cameras at each tracking station will record a field of view with 75 percent of the aircraft.
  - -- Multi-lensed manned tracker. Plus fixed camera stations. Set to see initial wing fuel release.
  - -- All special fixed cameras at impact--a manned camera assigned to obstructions at impact.
  - -- All special fixed cameras at impact--a manned camera assigned to obstructions at impact and data from tail mounted camera.

-- All cameras will collect usable data with time/distance evaluated from the range time base generator for correlation.

e. Documentation motion picture camera running at 24 fps will record the entire event from 1 minute prior to impact through slideout, a minimum of 5 minutes after rest. See Camera Plan schematics, Attachments B, C, D, E, and F.

- Manned high speed (film) camera, a 35/70 mm sequence camera and a video camera on at least two UH-1 helicopter flying platforms, right and left side (see Attachment F). A field of view wide enough to cover the aircraft approximately 500 feet diameter field of view with aircraft centered (reference AMK continuous photographic coverage, Section 3.1).

- Motion picture 16 mm - 35 mm camera. Video - VHS - U-matic format - shuttered high speed and standard frame cameras still coverage 35 mm and 70 mm. The Photographic Coverage will start about 10 seconds prior to impact and be followed (filmed) continuously through the slideout. A tracking camera will be assigned to the airframe until the fire department has any fire contained or sure of no pool fires or re-ignition. A low frame rate camera will be at a fixed position determined by the predicted termination points.

f. A lightweight high speed camera mounted on the vertical tail looking forward viewing the top of the fuselage and approximately 75 percent of the wing surface (see Installation schematics, Attachment I).

Structural (Fuselage, Wing) Deformation. Photographic plans based on the requirements of Section 3.2.

a. The overall plan emphasizes coverage of the fuselage and wing structural deformation.

b. High speed cameras range fixed position cameras tracking cameras - air platforms (see Attachments B, C, D, E, and F).

c. Two high speed cameras (see General Ground Plan for exact location). Flight profile will predict distance of slideout, etc.

d. Plan to use state-of-the-art equipment-pin-registered-rock steady images. Film will have resolving power to measure the airframe degradation.

- Ground (see Impact Site schematic, Attachment J) and airframe (Attachment A) grids will be used as a fixed base of measurement. Event time base data will be recorded on film.

- High speed frame rate with data base on film for analytical study.

- Data base frame rate correlation.

- High speed multi-camera continuous tracking units plus static camera positions filming from both sides and ends during aircraft travel to rest.

- Manned trackers will hold as large an image as possible (to be determined) for resolution of structural degradation. Each tracker will have dedicated subjects -- wing tanks -- engines -- tail, etc.

- Coverage by manned trackers with multiple-camera lens set-up and unmanned fixed remote cameras.

e. See Sections 3.1 and 4.1 regarding continuous photographic coverage.

f. See Sections 3.1 and 4.1 regarding tail cameras.

Occupant and Cabin Restraint Systems. Reference NASA Document OFRF 83-898 for details of cabin/occupant/seat/restraint/photographic/accelerometer system layout.

Cabin Requirements. Post-flight stills and motion picture onboard. As soon as possible after airframe is secured by the Air Force Flight Test Center (AFFTC) Crash Fire Rescue (CFR), cameramen will ride with the CFR to aircraft (see Cabin Video, Section 12).

OFDR/CVR. Due to the small size and erratic movement of the U.S. Navy/NATC flight recorder, a manned tracker with a long focal length lens may be needed to cover ejection through airborne flight to impact.

5.0 GENERAL PHOTOGRAPHIC CONSIDERATIONS

5.1 Ground Photo Safety Requirements

Ground crew personnel near crash site - 30 men - 15 each side (see Attachment D). Consideration by the Government and the Jet Propulsion Laboratory (JPL) must be given to the photographic/video team safety and general CID program concurrence required.

5.2 Airborne Crews - JPL/NASA/FAA

Each photo team consists of two photographers; total personnel in the air to be determined and approved by the CID team.

5.3 Safety Plan

See Attachment D

5.4 Security

NASA and AFFTC clearances permitting freedom of movement on the base and at the impact site must be arranged well in advance. Clearance must be obtained for the photo personnel to permit them the time required to adjust their equipment immediately prior to test (setting exposures--turning on video recorder).

6.0 POST-IMPACT FILM RECOVERY

6.1 Nose Camera

NASA-Ames Research Center/Dryden Flight Research Facility (NASA-A/DFRF) crew will remove radar dome for access for the JPL team to remove the camera/film.

6.2 Cockpit Camera

The JPL photo team will remove the camera/film.

6.3 Tail Camera

NASA cherry picker or backhoe to remove the camera for JPL.

6.4 Cabin Cameras

NASA-Langley Research Center to remove camera film.
JPL to remove video film.

6.5 Helicopters

To be determined

7.0 SPECIAL CONSIDERATION/CONSTRAINTS

7.1 Sun Position/Environmental

Sun position and all other basic environmental factors (heat mirage, atmospheric air quality, etc.) necessary for quality engineering photographs/video measurement data.

7.2 Pre-Impact Profile Photographic/Video Tests

Using PA-30, CID test article, and/or KC-135, conduct pre-impact tests for calibration of the ground photographic/video system airborne (helicopter, etc.) system, timing, communications, safety procedures, etc.

7.3 Flight Profile

Reference February 29, 1984, memorandum, Subject: INFORMATION: Full-Scale Transport Controlled Impact Demonstration Program--CID Impact Scenario.

7.4 Termination Envelope

Reference the Impact Profile, in case of termination, anytime after takeoff through to impact, after notification of intent by the Termination Officer, track and film the impending impact.

7.5 Flight/Abort "Go/No-Go" Criteria

Time of day (see Section 11.0), cabin lights/camera failures, etc., are partial criteria to be considered. Total go/no-go criteria to be developed and provided in the Mission Rules.

8.0 FILM PROCESSING

8.1 CID Day

Specially selected 35 mm/70 mm and vvideo for Public Affairs Officer (PAO).

8.2 Post-CID - Ground Cameras

If a Saturday/Sunday CID, Monday morning processing at Hollywood Film Enterprize. A print of all footage to FAA. A video tape will be made for all general distribution. All originals held at JPL (see reference DOT/FAA/CT-82/151).

8.3 Post-CID Video

Same as 8.2.

9.0 DISTRIBUTION OF ALL FILM/AUDIO VISUAL MATERIAL

9.1 CID Day

Release will go through CID Program Manager for clearance of usage by PAO; will include all motion picture film - stills - video - prints from video - dupes or copies - originals will be returned to JPL Ground Photography Manager at end of day (reference DOT/FAA/CT-82-151).

9.2 Film/Tape

Still or video tape exposed on the CID day will be collected if it is considered sensitive material - or have a scientific value to the mission - this is to include all personnel filming of the CID test under contract and indeed personnel film if it will be of value to the results of the CID.

10.0 CINE SEXTANT TRACKING CAMERAS

Placement of manned tracking camera units are vital in meeting the data gathering goals of the CID requirements. The manned tracking system has many years of proven reliability. It is a portable self-contained multiple camera system with built-in data base timing systems; the continuous tracking advantage is <u>mandatory</u> for both the AMK and structural experiment. The time factor advantage for pre- and post-rapid deployment is also very cost effective. Cameras/operators must be placed in the locations specified (see Attachment D). Problems literally increase by the square of the distance. Any compromise to these specified locations will seriously degrade the quality of the final product. See on location film test of February 26, 1984.

11.0 TIME OF DAY

Time of day for the best photographs will be no later than 8 a.m. per test day (see Film Test of February 26, 1984). Early morning haze - wind, dust - the many different forms of environmental air pollution will be taken into consideration. Depending on morning environmental conditions or in the event of technical problems, a late afternoon flight time should be considered if the photographic/video conditions are conducive for engineering documentation purposes. A visual system is in process of development to help determine the visual versus the film degradation.

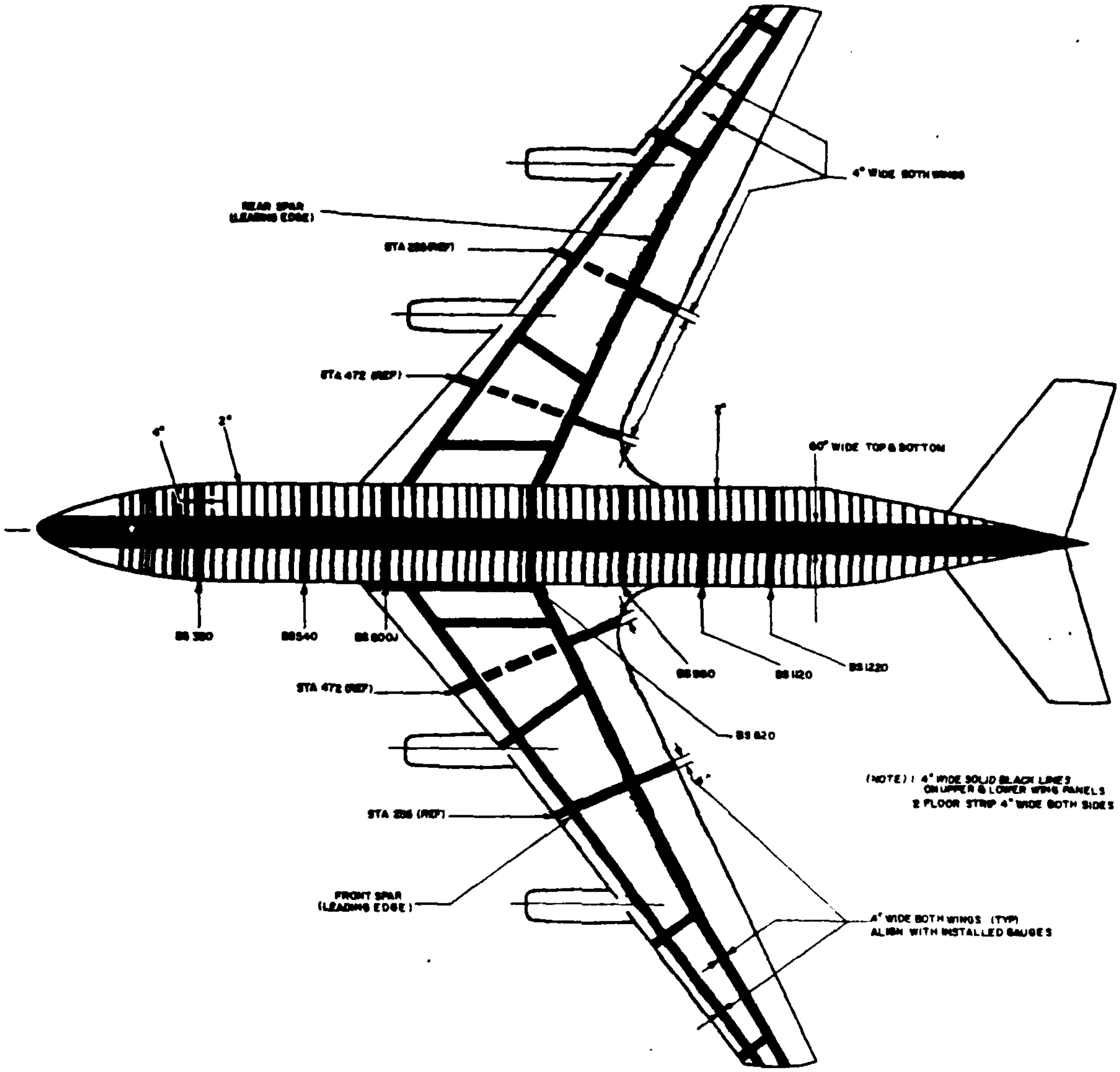
12.0 CABIN VIDEO PLANS

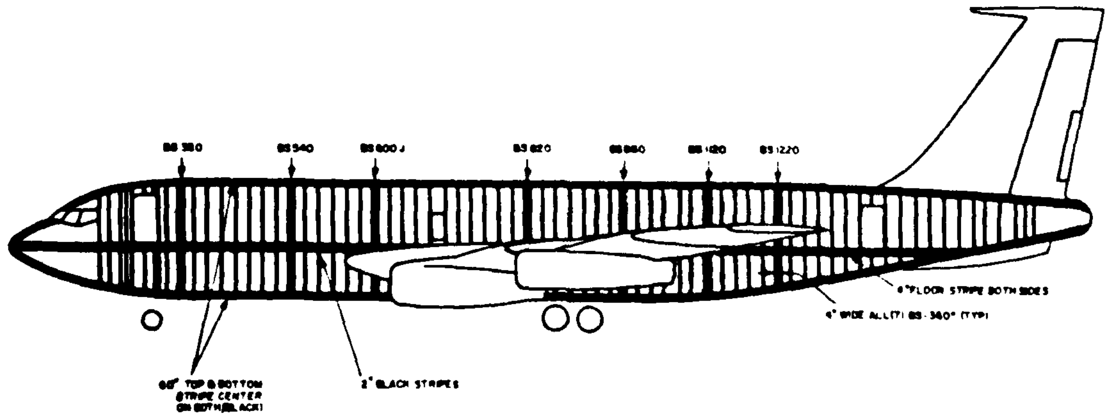
High speed shuttered camera looking at the passengers during impact. (Instrumentation Marketing Corporation H.V.R.B. 200 airborne high speed video recorder with self-contained power source. Require real time down link for camera lights verification - high speed video or standard video.

13.0 CONTRACT

The JPL-FAA Interagency Agreement Number DTFA03-80-A-00215, Modification 11, Task 13, Attachment L. This document provided the contractural authority, general requirements, and funding authorization for the CID program.

Attachment A

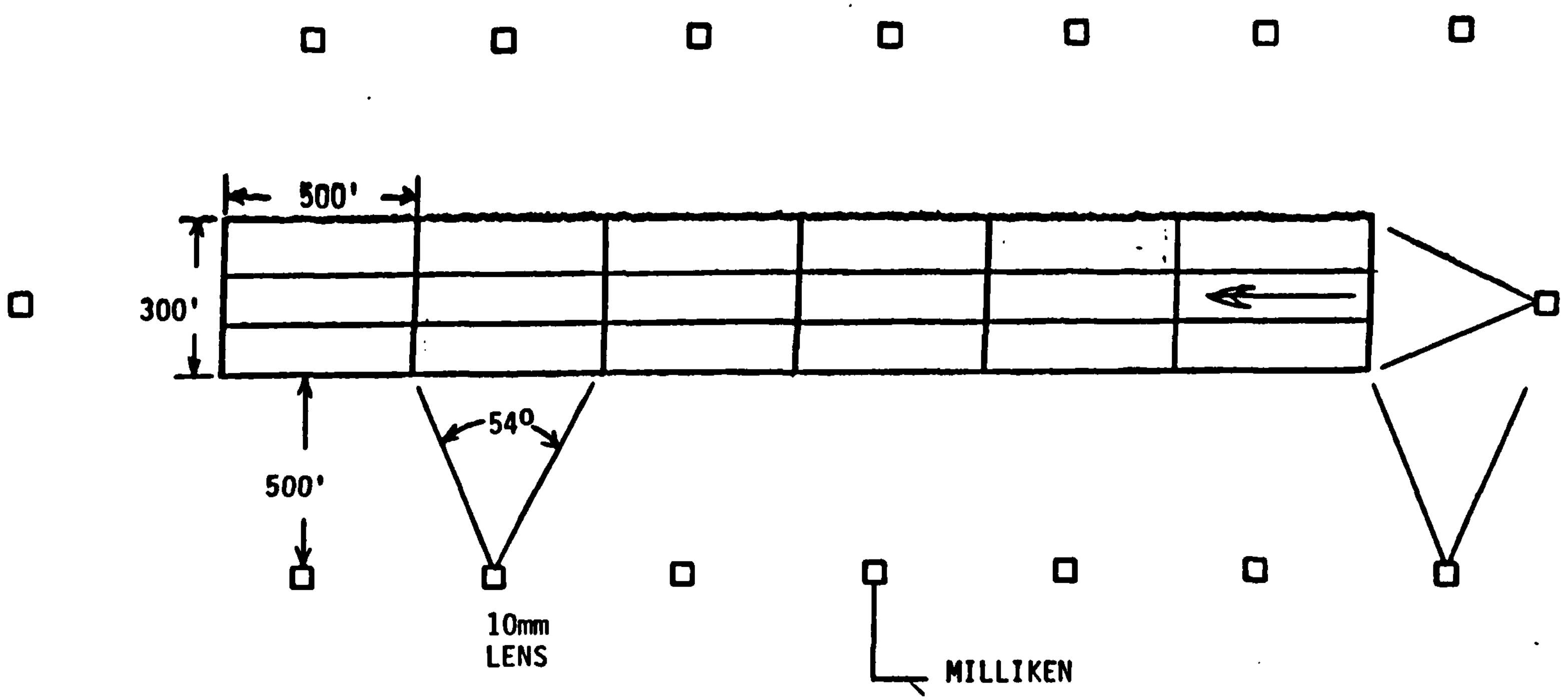




ATTACHMENT B

GROUND CAMERA POSITIONS

UN-MANNED:FIXED:REMOTES

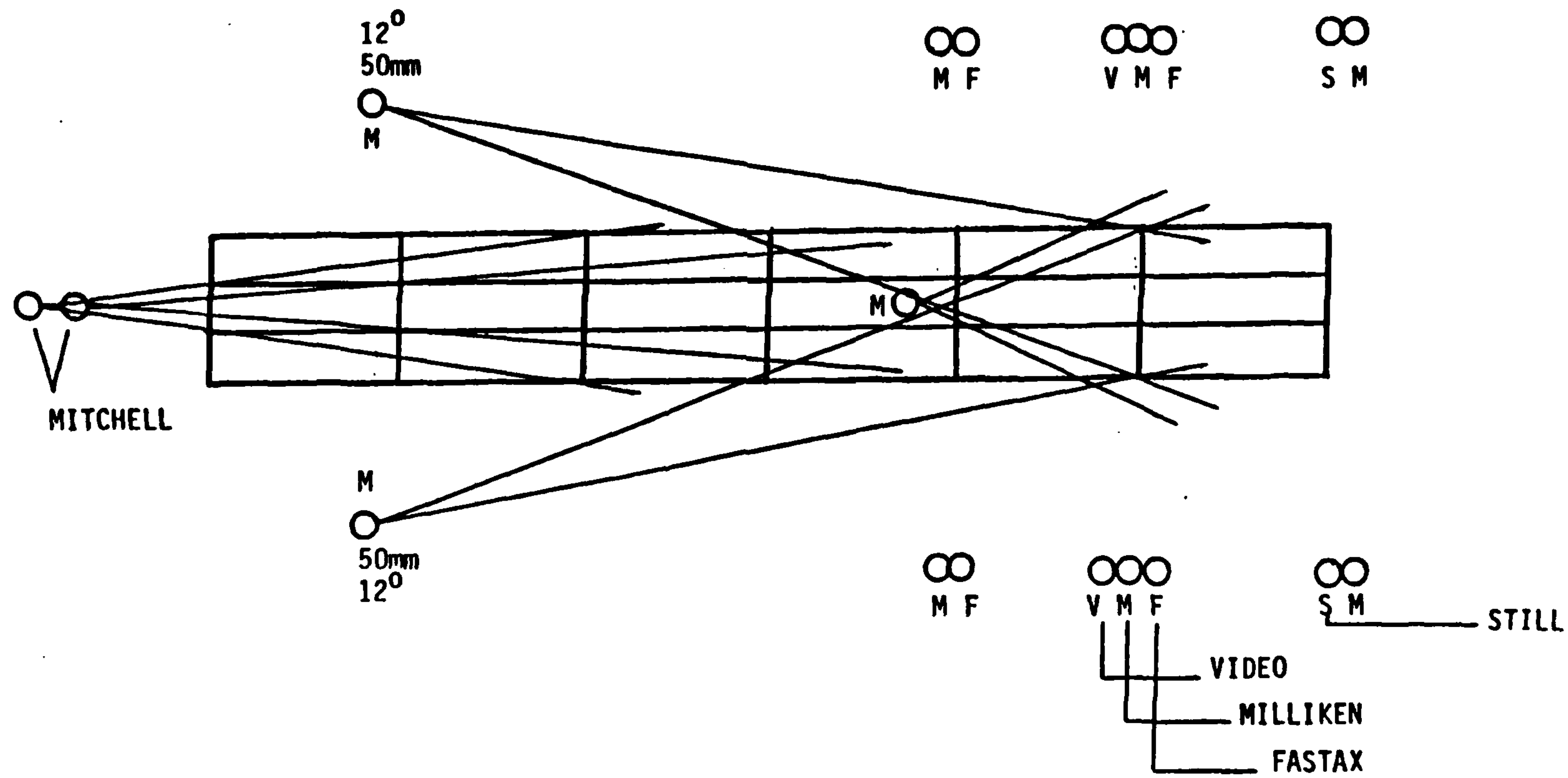


SIXTEEN MILLIKEN (16mm) HIGH SPEED MOTION PICTURE CAMERAS. EACH CAMERA OPERATES AT 400 FPS. THEY WILL BE FITTED WITH 10mm LENSES (54° ANGLE OF VIEW).

ATTACHMENT C

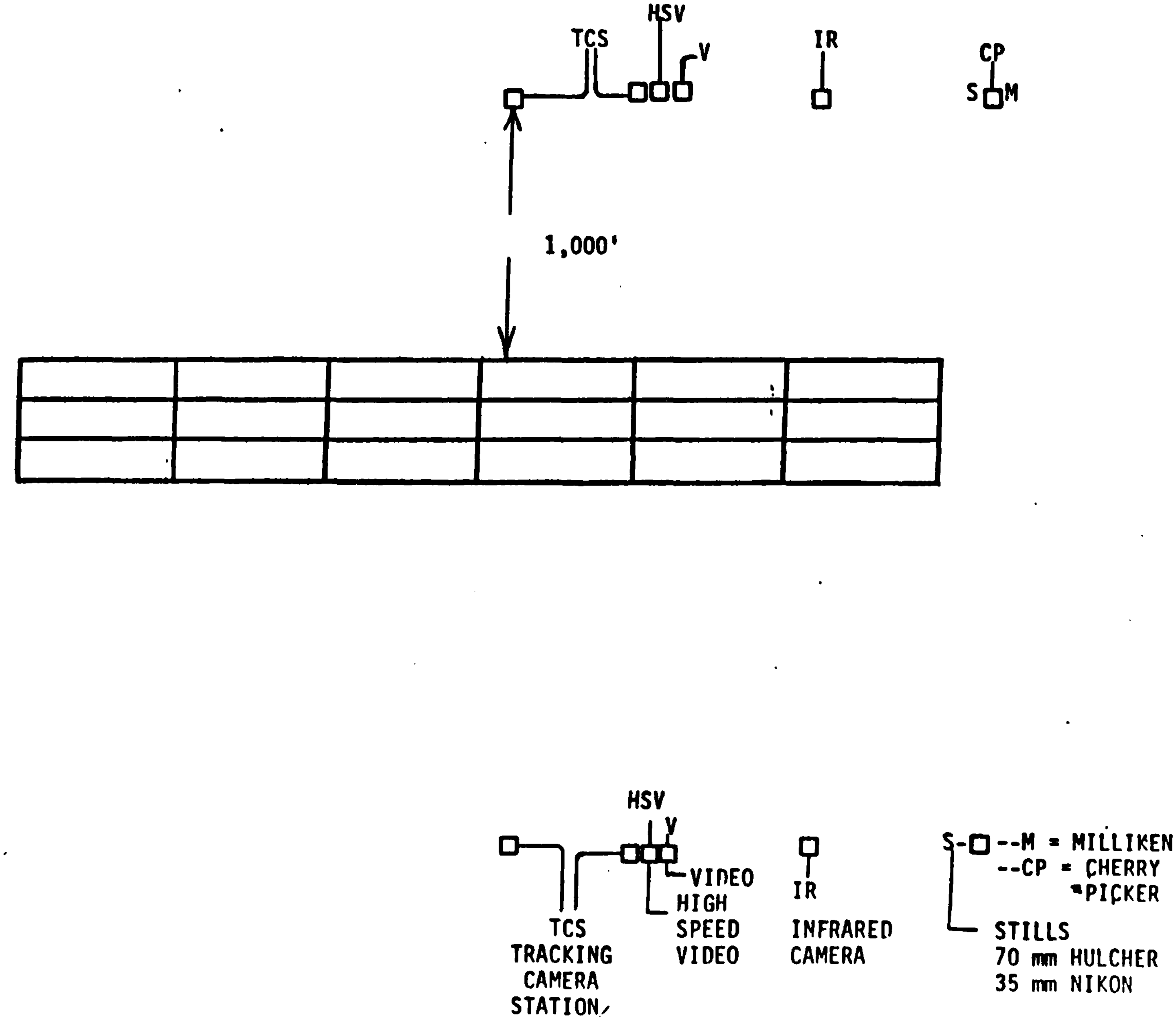
GROUND CAMERA POSITIONS

UN-MANNED:SPECIAL:REMOTE



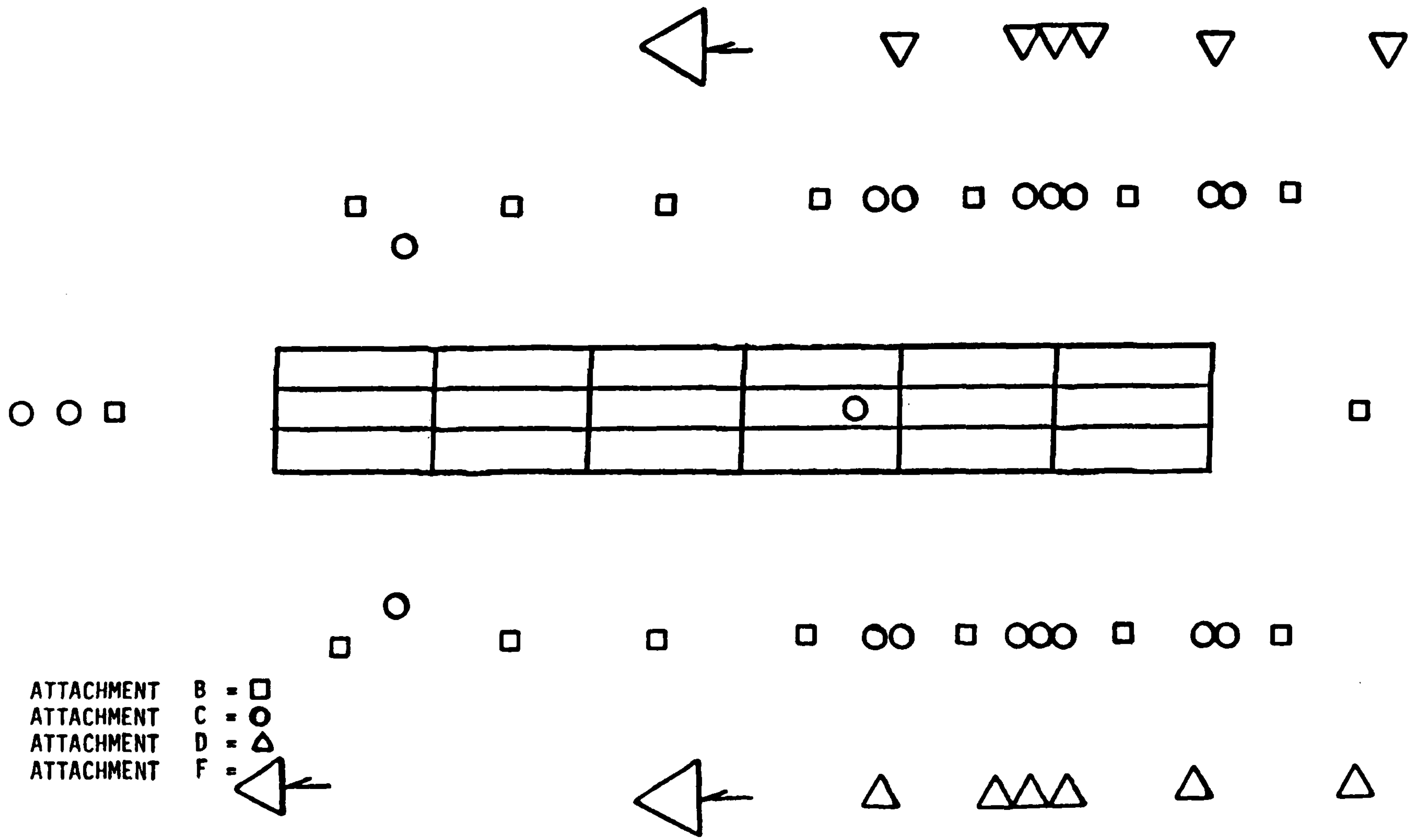
ATTACHMENT D

MANNED CAMERA STATIONS



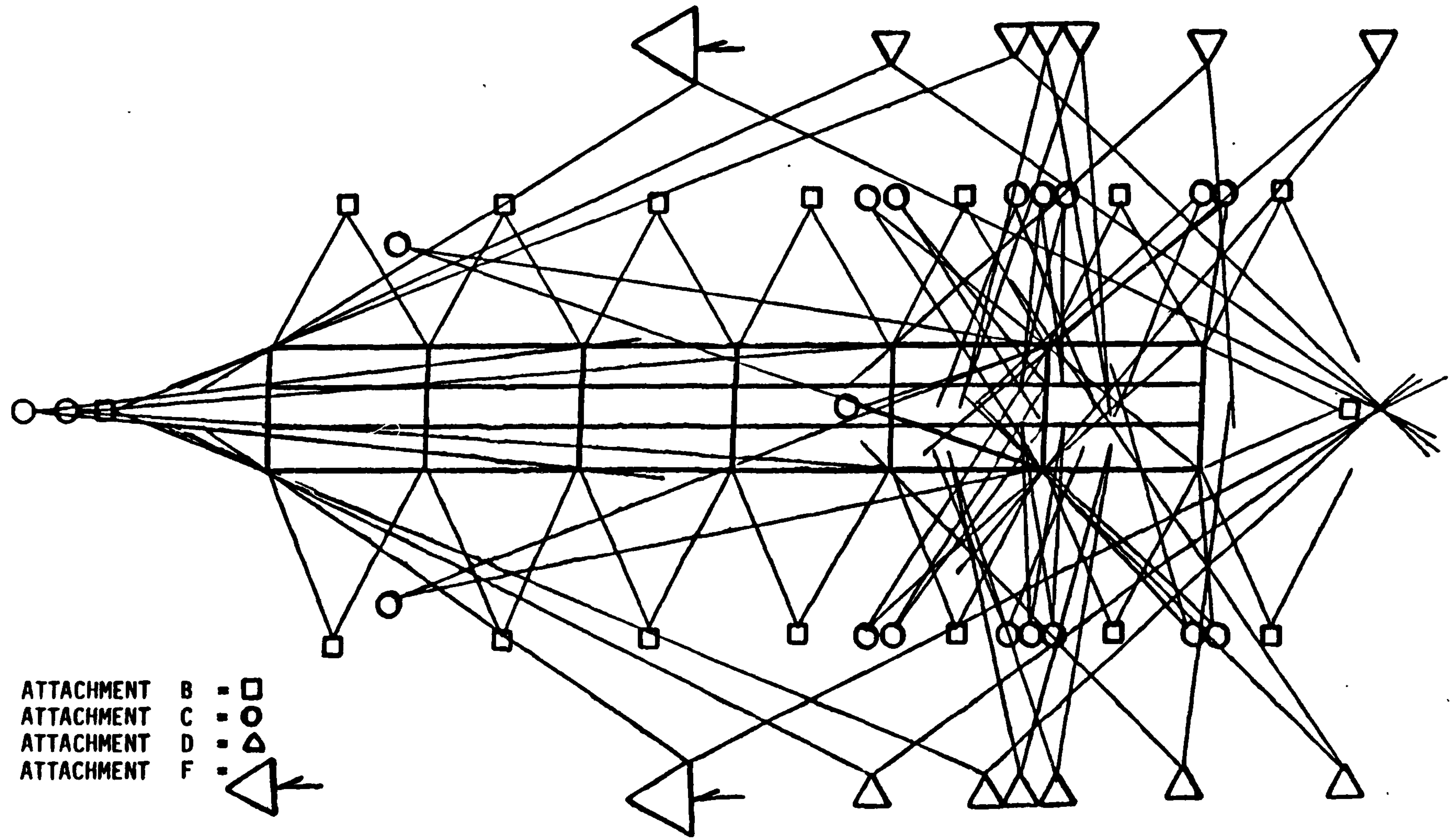
ATTACHMENT E

COMPOSITE CAMERA POSITIONS



ATTACHMENT E

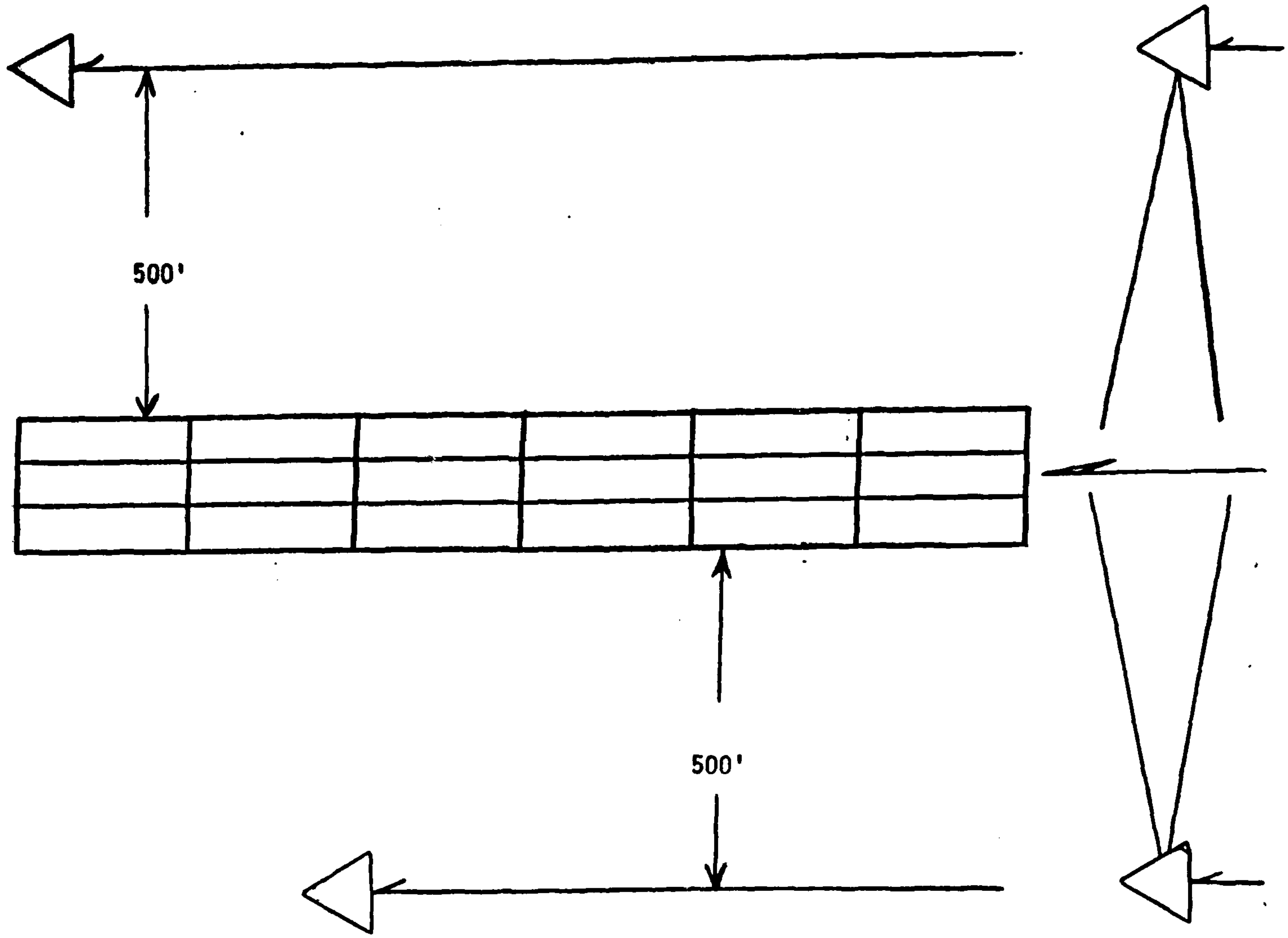
COMPOSITE CAMERA POSITIONS



ATTACHMENT B = □
ATTACHMENT C = ○
ATTACHMENT D = △
ATTACHMENT F =

ATTACHMENT F

AIR PLATFORM (HELICOPTERS)



ATTACHMENT G

COCKPIT CABIN CAMERA

CAMERA WILL BE MOUNTED ON A BRACKET MOUNTED ACROSS THE OPEN COCKPIT DOOR WAY - APPROXIMATELY 40 INCHES ABOVE THE FLOOR TO SIMULATE THE PILOTS FIELD OF VIEW WILL INCLUDE, A ONE THIRD HORIZON THROUGH THE WINDSHIELD

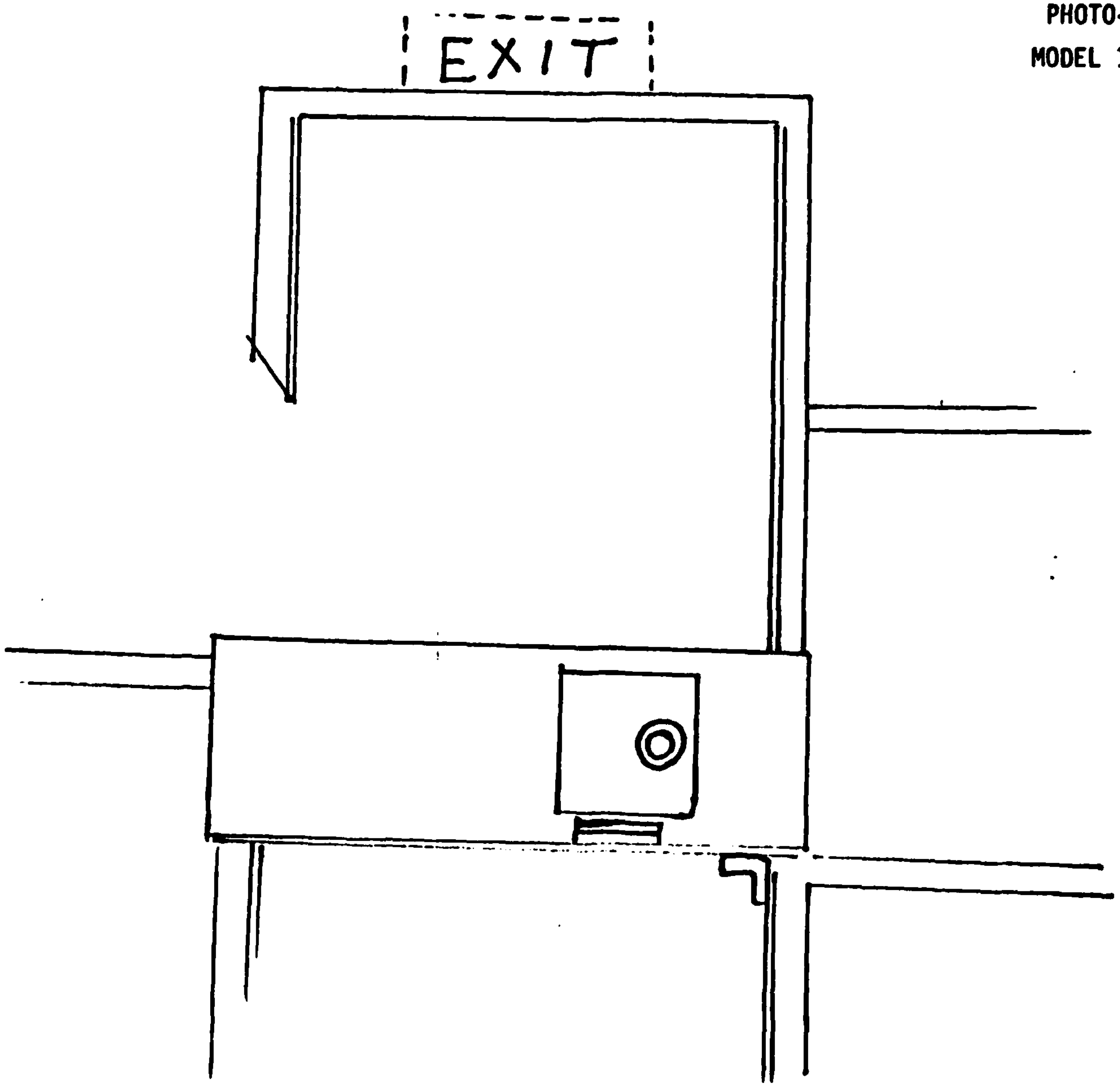
CAMERA:	16MM PHOTO SONICS 1P CAMERA
SUGGESTED CAMERA SPEED:	200 FPS
CAMERA RUNNING TIME:	AT 200 FPS - 40 SECONDS
LENS:	10MM 54 DEGREE COVERAGE
CAMERA OPERATING POWER:	AT 200 FPS - 28 VOLT 24A SURGE - 12A CONTINUOUS
BATTERY:	30 VOLT PACK - 30 AMP HOUR IN CASE (60 LBS)
UP-LINK COMMAND:	TURN ON 10 SECONDS BEFORE ESTIMATED IMPACT

ATTACHMENT G

COCKPIT CABIN CAMERA INSTALLATION

PHOTO-SONICS

MODEL 16mm-1P



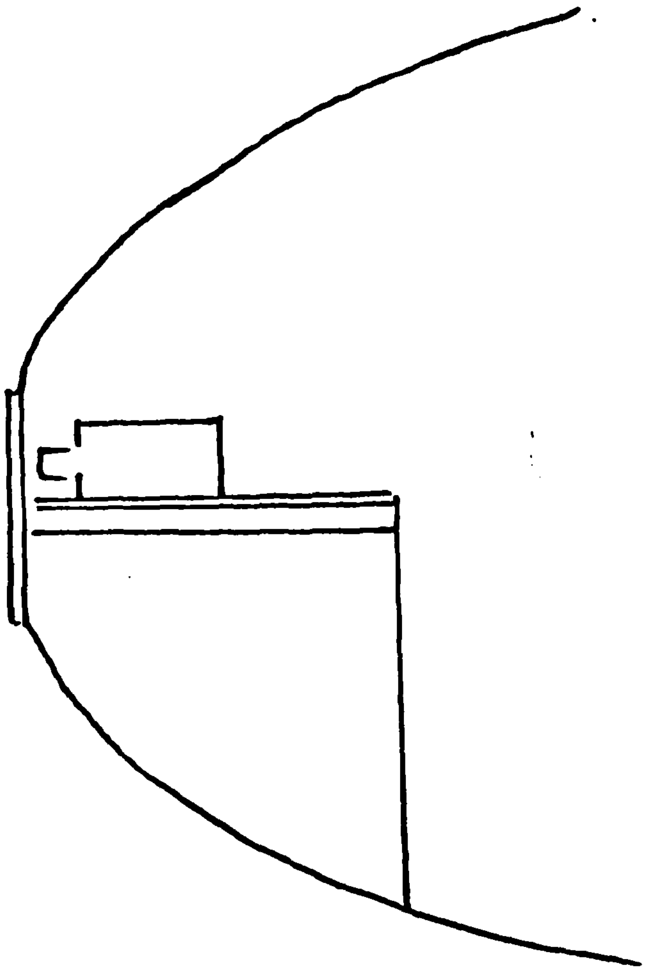
ATTACHMENT H

NOSE CAMERA

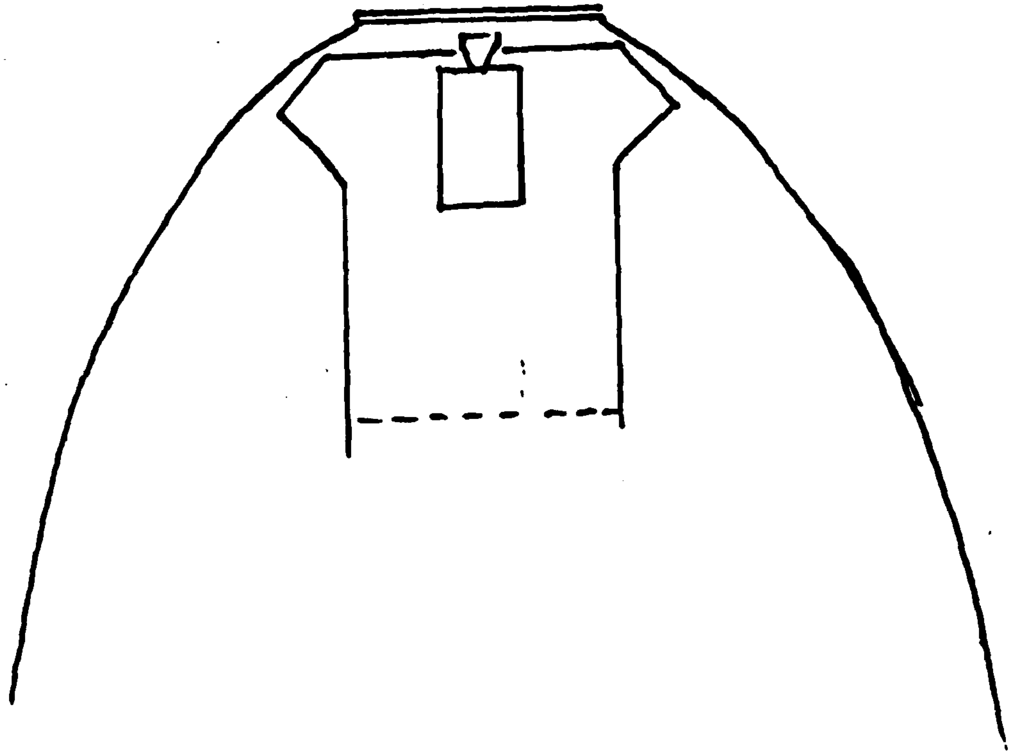
CAMERA IS TO BE MOUNTED IN THE REMOVEABLE NOSE CONE (WITH TWO TV CAMERAS) TO SHOW THE SIMULATED VIEW THE PILOT HAS DURING THE TEST

PHOTO SERVICES:	16MM PHOTO SONICS 1VN CAMERA WITH 400' MAGAZINE
SUGGESTED CAMERA SPEED:	125 FPS
CAMERA OPERATING POWER:	AT 125 FPS - 28 VOLT - 24 AMP SURGE - 12 AMP CONTINUOUS
BATTERY:	30 VOLT - 30 AMP HOUR PACK
CAMERA RUNNING TIME:	AT 125 FPS - 2 MIN 8 SECONDS
UP-LINK COMMAND:	SIGNAL TIME - ACTIVATE NOSE CAMERA - 30 SECONDS BEFORE ESTIMATED IMPACT

ATTACHMENT H
NOSE CAMERA
PHOTO-SONICS
MODEL 16mm-1P



SIDE VIEW



TOP VIEW

ATTACHMENT I

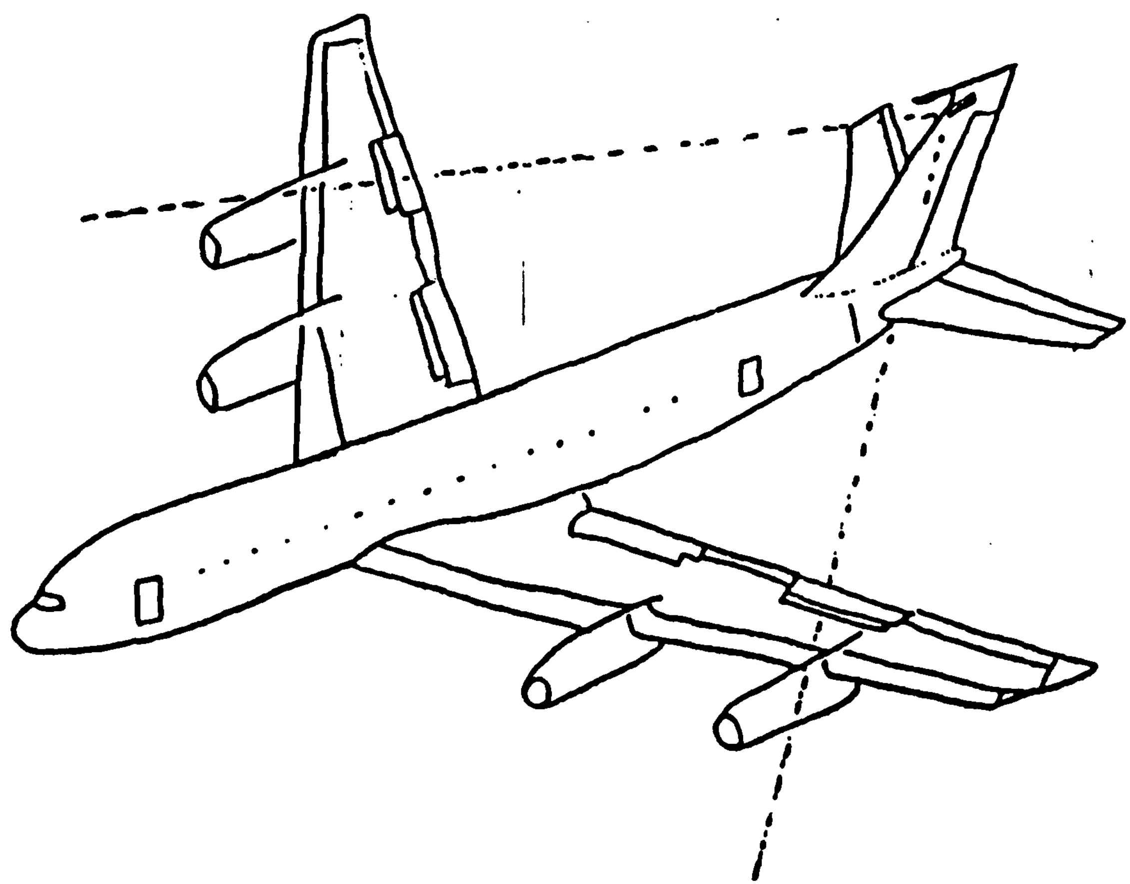
TAIL CAMERA

CAMERA TO BE MOUNTED EXTERNALLY ON THE VERTICAL STABILIZER - TOP LEADING EDGE TO SHOW AMK FUEL DISBURSEMENT AND FUSELAGE DISTORTION

CAMERA:	16MM PHOTO SONICS 1VN CAMERA WITH 200 FOOT MAGAZINE
SUGGESTED CAMERA SPEED:	200 FPS
RUNNING TIME:	200 FPS - 40 SECONDS
LENS:	80 DEGREE COVERAGE OF 5.9 MM LENS WILL INCLUDE ALL FOUR ENGINES - PLUS NOSE AND FUSELAGE
BATTERY:	SWITCH ORDER AMPS THEN VOLTS (30 AMP HOUR) (30 VOLT PACK) IN CASE (60 LBS)
UP-LINK COMMAND	TURN ON 10 SECONDS BEFORE IMPACT

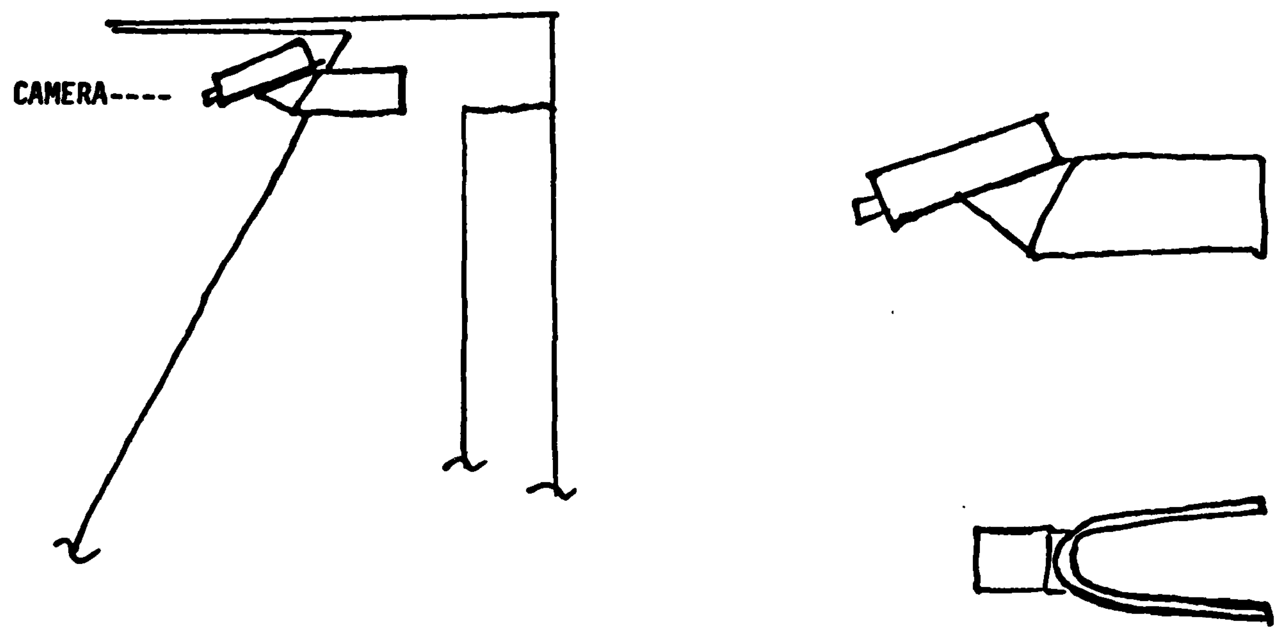
THE CAMERA WILL BE INCASED IN A FIRE RETARDENT BLANKET TO PROTECT IT FROM MOISTURE.

ATTACHMENT I



ATTACHMENT I

TAIL CAMERA
PHOTO-SONICS
MODEL 16mm-1VN



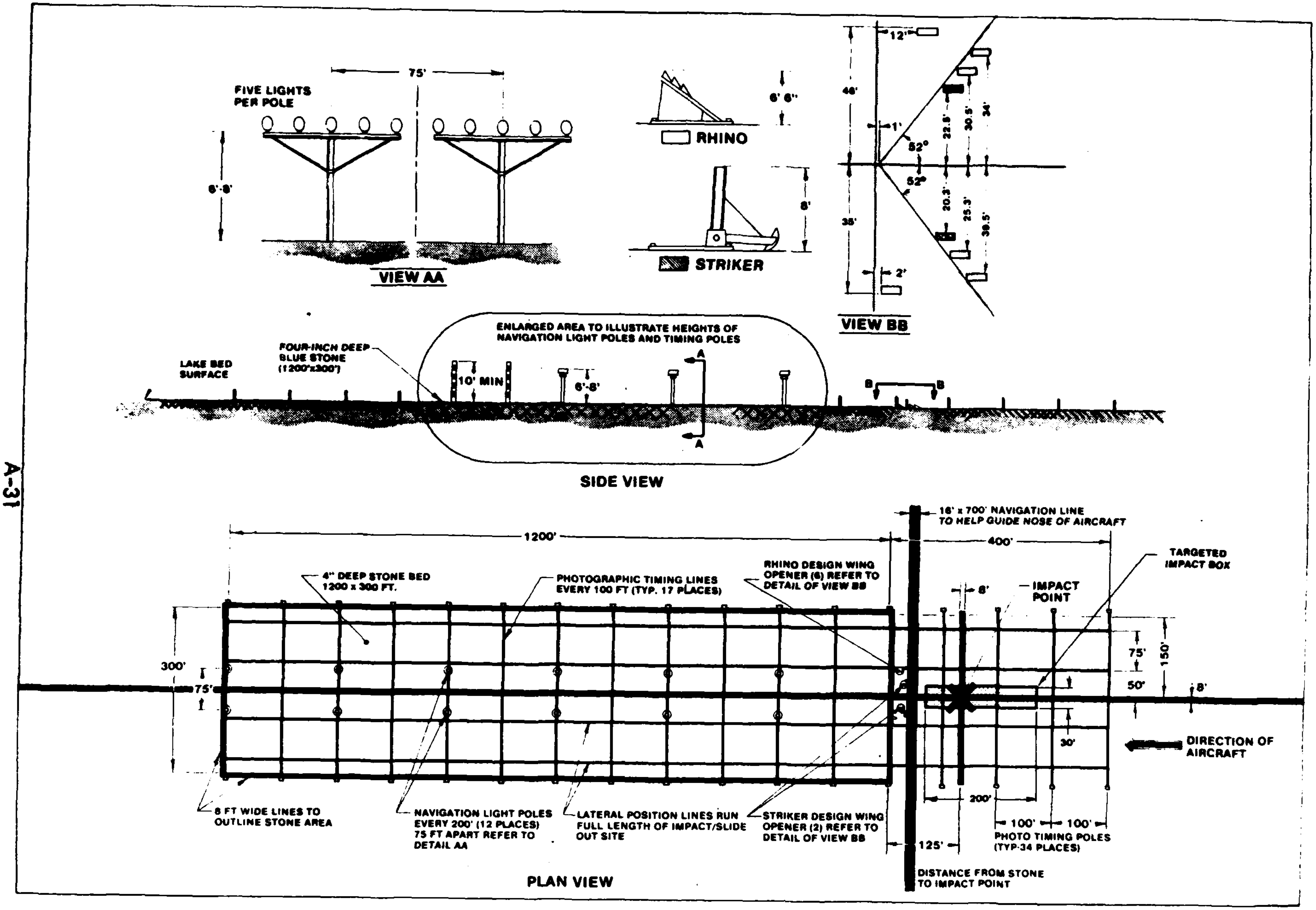


FIGURE 8. CID IMPACT SITE SCHEMATIC

ATTACHMENT K

CONTROLLED IMPACT DEMONSTRATION

GROUND PHOTOGRAPHY

BY

JOHN D. GREGOIRE

SAFETY

BY

CHARLES J. PETERS

JET PROPULSION LABORATORY
PASADENA, CALIFORNIA

JANUARY 1984

SAFETY PROCEDURE FOR GROUND PHOTOGRAPHIC COVERAGE OF THE CID PROGRAM, AT EDWARD AIR FORCE BASE ON JULY 24, 1984.

CAMERA TRACKING TEAMS

Tracking teams will consist of two photographers and a designated driver. They will be provided radio equipped pick up trucks for direct contact with their Communication Landing Observer.

TEAM DRIVERS

Drivers will monitor communications during the entire test.

Vehicles, with engines running, will be placed in strategic positons ready to provide immediate evacuation for the photograhic crew.

COMMUNICATION LANDING OBSERVER

Two NASA/DRYDEN personnel will be assigned this task with responsibilities toward:

Maintaining communications with tracking team members and drivers.
Visually monitoring the approach of the aircraft.
Initiating tracking team evacuation.

TRACKING TEAM EVACUATION

NASA has determined that loss of aircraft control will occur at 200 feet. Below 200 feet the aircraft is committed to impact. Data from the flight simulator will be utilized to provide information on directional angles of the aircraft below this level. Evacuation routes will be projected from this data.

REQUIRED TRAINING

Prior to the actual landing, the tracking team and CLO personnel will perform a minimum of three exercises, aquainting all personnel with established evacuation routes and communication procedures.

FAA/JPL STAFF PHOTOGRAHERS

Lifting platforms (Cherry Pickers) will be provided for FAA/JPL photograhers. These vehicles will be positoned 1200 feet from the initial point of impact.

AIRCRAFT INTERIOR DOCUMENTATION TEAM

Documentation of interior damage to the aircraft should begin immediately following fire containment. After securing permission from the fire officer in charge, the team will enter the aircraft to record the actual damage to the interior. A three person team will be utilized for this task. This team will consist of: one motion picture cameraperson, one still cameraperson and one video cameraperson.

AIRCRAFT FILM RECOVERY TEAM

Film recovery team will enter aircraft immediately after the documentation team has exited the aircraft.

POST TEST ACCESS

Immediately following the C.I.D. Test an access route between the impact site and NASA/Dryden must be opened.

HELICOPTER - (2)

Helicopter will travel alongside and slightly ahead of 720 aircraft.

Helicopter will pick up aircraft approximately 1,000 feet before impact. During impact and slide out, helicopter will maintain a positon ahead of and above 720 aircraft.

Two helicopters will be used for this test. Copters will either be on opposite sides of the aircraft moving in the same direction (Ahead and Above), or the copters may be on the same side of the 720: one ahead looking aft and one trailing behind looking forward. Positions will be determined within the month of January.

FILM DIRECTOR

Film Director will move openly about the test site with the Communication Landing Observers.

ATTACHMENT L

BRIEF TASK IMPLEMENTATION PLAN FOR THE FULL-SCALE TRANSPORT (B-720) CRASH TEST GROUND PHOTO INSTRUMENTATION, DOCUMENTATION AND ANALYSIS

(TASK 13)

FOR

DEPARTMENT OF TRANSPORTATION
FAA TECHNICAL CENTER
ATLANTIC CITY, NEW JERSEY

APRIL 1983

BY

JET PROPULSION LABORATORY
CALIFORNIA INSTITUTE OF TECHNOLOGY
PASADENA, CALIFORNIA

I. INTRODUCTION:

The purpose of this short writeup is to give an overview of the JPL involvement in the photographic ground coverage and consequent photographic analysis of the data of the forthcoming Boeing 720 crash test to be held in 1984 at NASA Dryden Flight Research Facility.

This task will suppliment the ongoing support JPL is providing to FAA on their Antimisting Fuels Technology Program.

II. SCOPE AND DELIVERABLES:

In performing the above task, JPL will provide the following (see attached Figure and milestone chart for further details):

1. Document the preflight events around the plane including blending, refueling, taxing, etc.

2. Document the crash events with minimum of eight ground stations covering the events from the crash point to where the plane comes to a stop including:

   a. Motion pictures up to 400 FPS.
   b. Tracker photographic coverage to obtain overall view.
   c. Still photographs at 3-10 FPS.
   d. Standard and high speed TV coverage.
   e. Thermographic, (Infra-red) video coverage.
   f. Two high-speed camera coverage between 1,000 to 2,000 FPS at stations mutually agreed upon by FAA and JPL.

3. Utilize the unique image enhancement and analysis techniques to document various crash events to obtain fireball growth rate and history of crash landing.

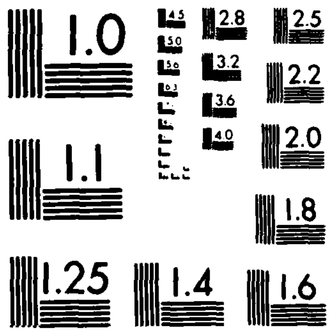
4. Provide a master copy of the selected film coverage as mutually agreed by FAA and JPL.

5. Provide all the raw photographic material.

6. Provide all ground photo equipment.

AD-A171 719 FULL-SCALE TRANSPORT CONTROLLED IMPACT DEMONSTRATION PROGRAM PHOTOGRAPHIC..(U) JET PROPULSION LAB PASADENA CA J D GREGOIRE APR 86 JPL-D-2534 DOT/FAA/CT-85/35 2/5

UNCLASSIFIED DTFA03-80-A-00215 F/G 14/5 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

In successful completion of this task within constraints of time and budget, FAA will provide:

1. JPL the planned Boeing 720 crash date six weeks in advance.

2. A touch-and-go airplane test for photographic equipment calibration.

3. If the airplane crash date is postponed more than two days from the planned test date, costs will be effected.

4. The ground marks to obtain the length scale.

5. Reference points on the airplane as mutually agreed upon by FAA and JPL.

6. Overnight guards for equipment safety.

III. TECHNICAL APPROACH:

Ground will be surveyed at each camera station. The relative location of the camera stations are shown in the attached Figure. A higher concentration of cameras will be positioned at the impact point. Each station will have a 400 FPS (Milliken) camera with a time-base generator. Two stations will share power from a generator. The two remote units will be battery powered and self contained. The camera stations near impact will have a high speed (Fastax) 2,000 FPS (approximately) and a still sequence camera operating from 3 to 10 FPS. All camera stations in the near proximity of the crash site will be unmanned. Each tracking camera unit will be self contained with two vehicles, camera trailer, and generator. Each mount will hold 2 to 3 long-lensed cameras. Video will be used throughout the test. Both standard rate and high speed video will be employed; tape size frame 1/2 to 3/4 inch.

The infra-red thermography will be at a manned station near the tracking mount.

Unique JPL image analysis techniques will be applied to both standard and infrared coverage to further enhance our understanding of the crash scenario, fireball growth rate, and location and duration of ignition sources.

BRIEF TASK IMPLEMENTATION PLAN FOR THE FULL-SCALE TRANSPORT (B-720) CRASH TEST GROUND PHOTO INSTRUMENTATION, DOCUMENTATION AND ANALYSIS

(TASK 13)

FOR

DEPARTMENT OF TRANSPORTATION
FAA TECHNICAL CENTER
ATLANTIC CITY, NEW JERSEY

APRIL 1983

BY

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    c. Still photographs at 3-10 FPS.
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    e. Thermographic, (Infra-red) video coverage.
    f. Two high-speed camera coverage between 1,000 to 2,000 FPS at stations mutually agreed upon by FAA and JPL.

3. Utilize the unique image enhancement and analysis techniques to document various crash events to obtain fireball growth rate and history of crash landing.

4. Provide a master copy of the selected film coverage as mutually agreed by FAA and JPL.

5. Provide all the raw photographic material.

6. Provide all ground photo equipment.

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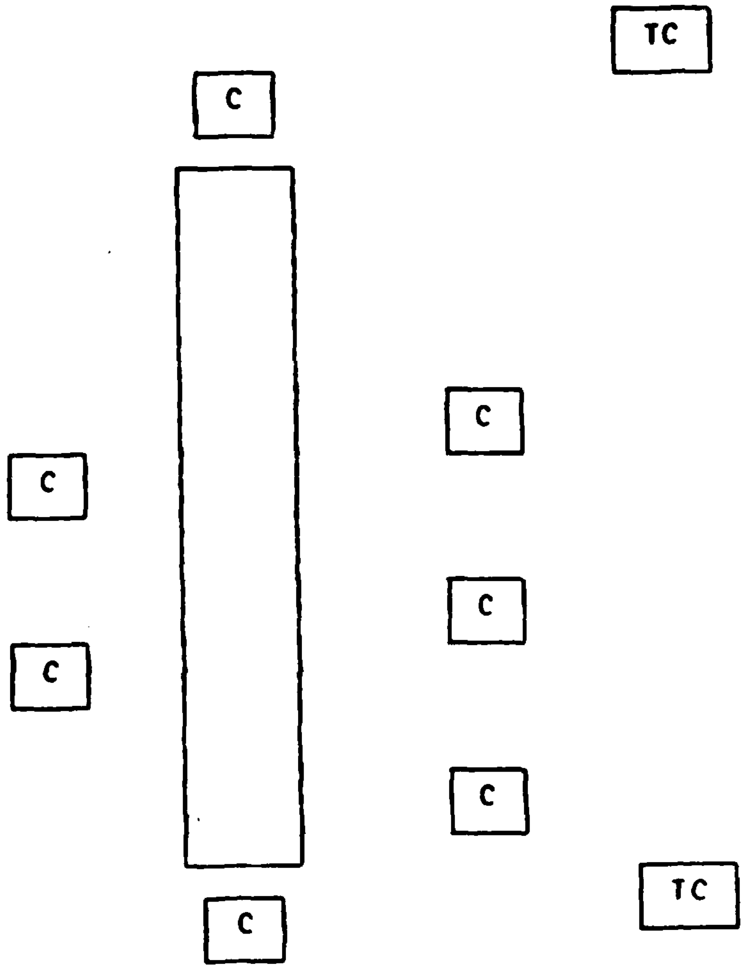
IV. COST ESTIMATION:

$100K

TRANSPORT CRASH TEST CAMERA POISTIONS



TC = TRACKING CAMERAS

C = CAMERA POSITIONS

GROUND PHOTOGRAPHY MILESTONE

	FY'83			FY'84												FY'85
DIRECTIVE / MONTH	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10
INITIAL LAYOUT AND INTERFACE WITH FAA AND NASA.	>>>	>>>	>>>													
STRAWMAN - MOCK-UP			>>	>>>	>											
DETAIL BLUE PRINT OF SHOOTING SPECIFICATION				>>>	>>>	>>>	>>>	>>>	>							
PROCUREMENTS						>>>	>>>	>>>								
SITE PREPARATION								>	>>>	>>>	>					
CRASH TEST												>				
FILM EDITING AND ANALYSIS												>	>>	>>	>>	>>

JPL PHOTO INSTRUMENTATION EQUIPMENT

FASTAX	16mm x 100' Full Frame and ½ frame 35mm x 100'
FAIRCHILD	16mm x 400' Full Frame
HYCAM	16mm x 400' Full Frame 8mm or ½ 16 Head
PHOTO SONICS	35mm x 400' Full Frame
MILLIKEN	16mm x 400'
MITCHELL MONITOR	16mm x 400'
ARRIFLEX "S"	16mm x 100' and 400' Used with time-lapse motor kit.
CINE SPECIAL	16mm x 100' and 200'
DYNAFAX	35mm x 33⅞ inch strip of film

CHADWICK-HELMUTH PULSE CAMERA: Use with strobex strobe system

KODAK ANALYST SUPER 8 CAMERA

DRESSEN-BARNES Camera

EG&G MICRO FLASH ELECTONIC FLASH

EG&G MODEL 501 ELECTRONIC FLASH

Time Base Generators

ARRIFLEX SR 16mm Motion Picture Camera

PANASONIC COLOR VIDEO CAMERA

JVC COLOR VIEDO CAMERA

PANASONIC VHS COLOR VIDEO RECORDER

NAGRA ¼" Tape Recorder for Sync-Sound

6-17-82 [illegible]

APPENDIX B

CONTROLLED IMPACT DEMONSTRATION

Impact Site and Impact Flight Profile

CONTROLLED IMPACT DEMONSTRATION

"C.I.D."

FAA

CAMERA POSITION	CAMERA #	CAMERA TYPE
DATA SYSTEM	JPL Jet Propulsion Laboratory California Institute of Technology 4800 Oak Grove Drive Pasadena, CA 91109	LOADER ASSIGNED
FRAMES PER SECOND	TYPE OF FILM	JOHN GREGOIRE DIRECTOR OF PHOTOGRAPHY

Impact Site - Security Control and Access

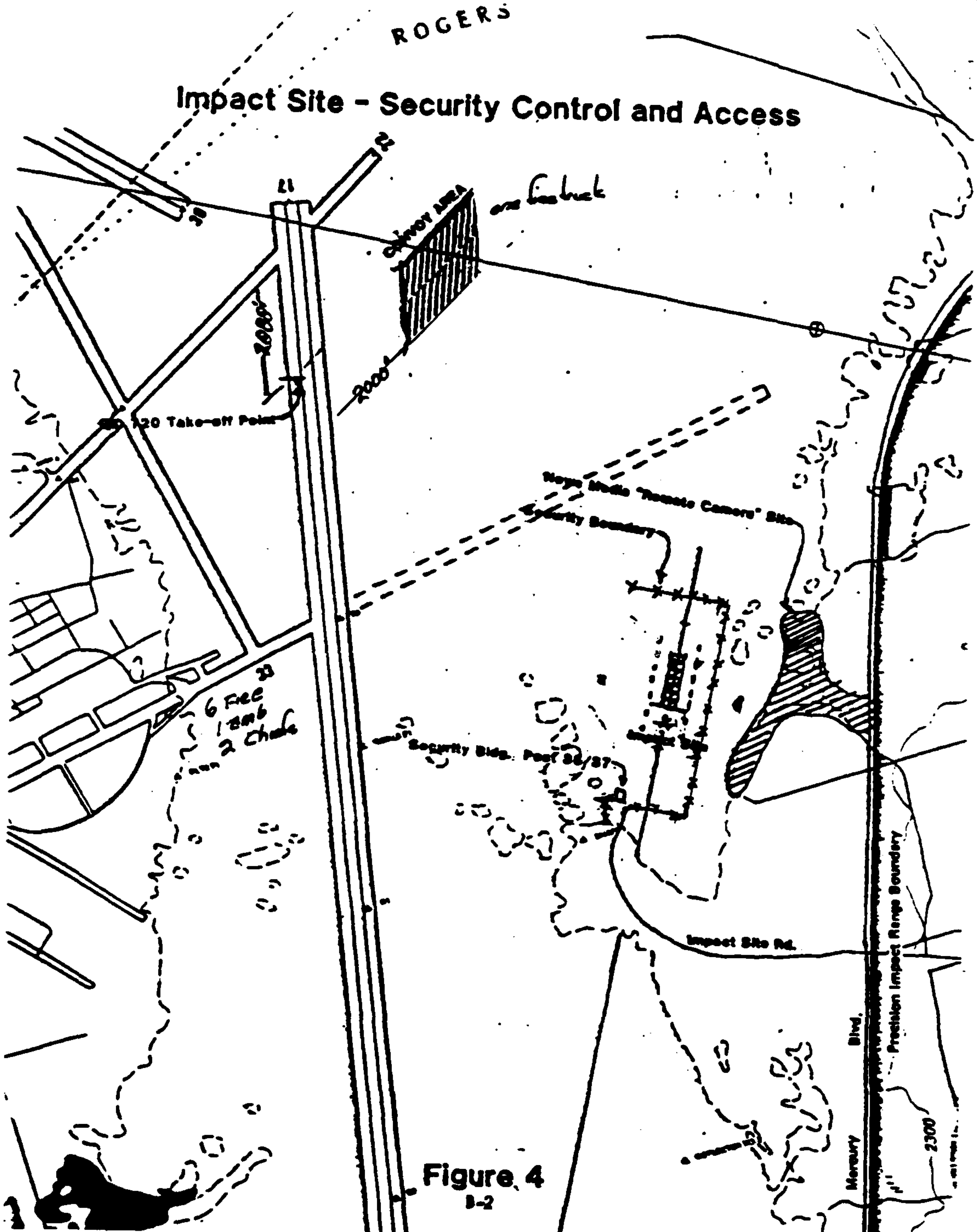
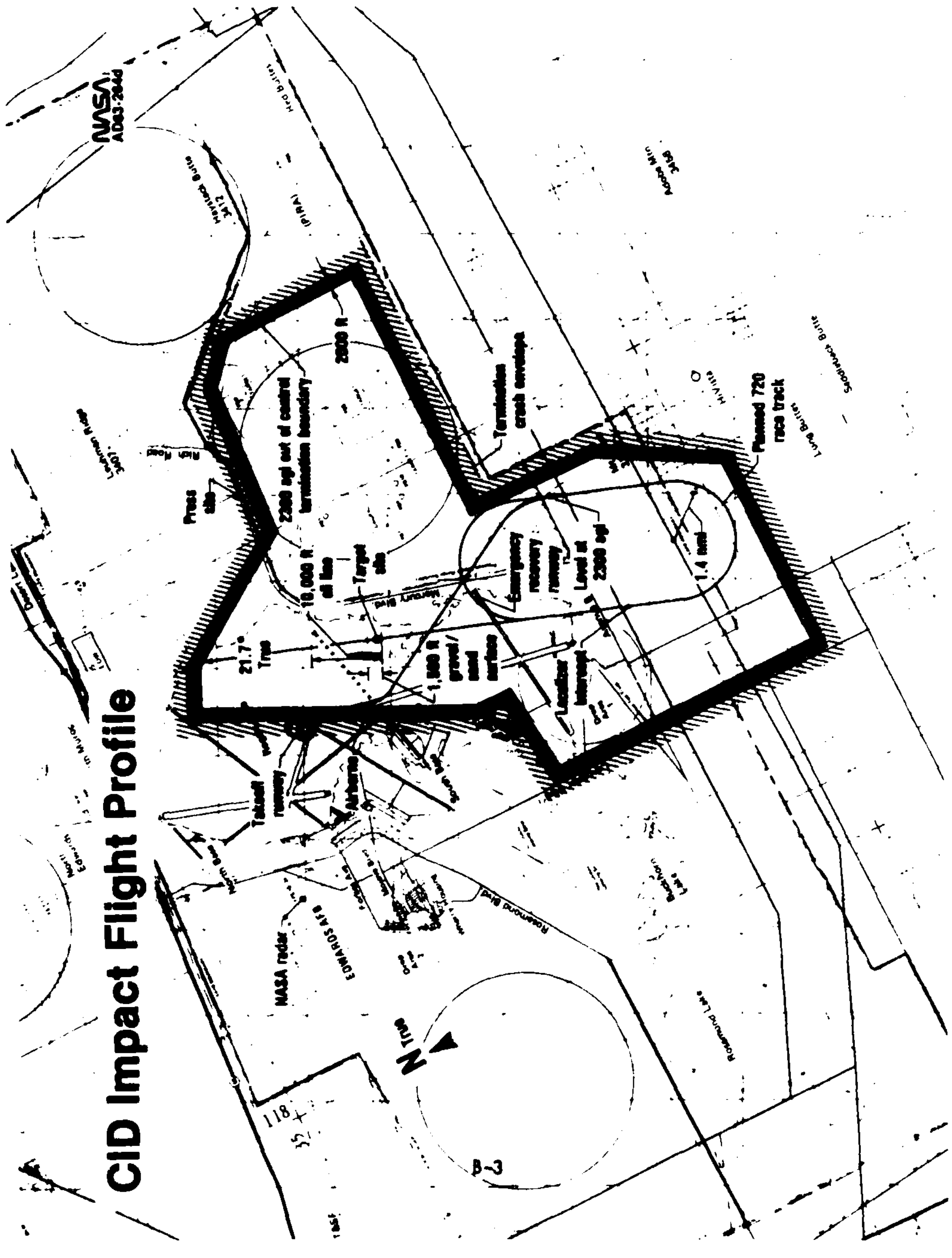
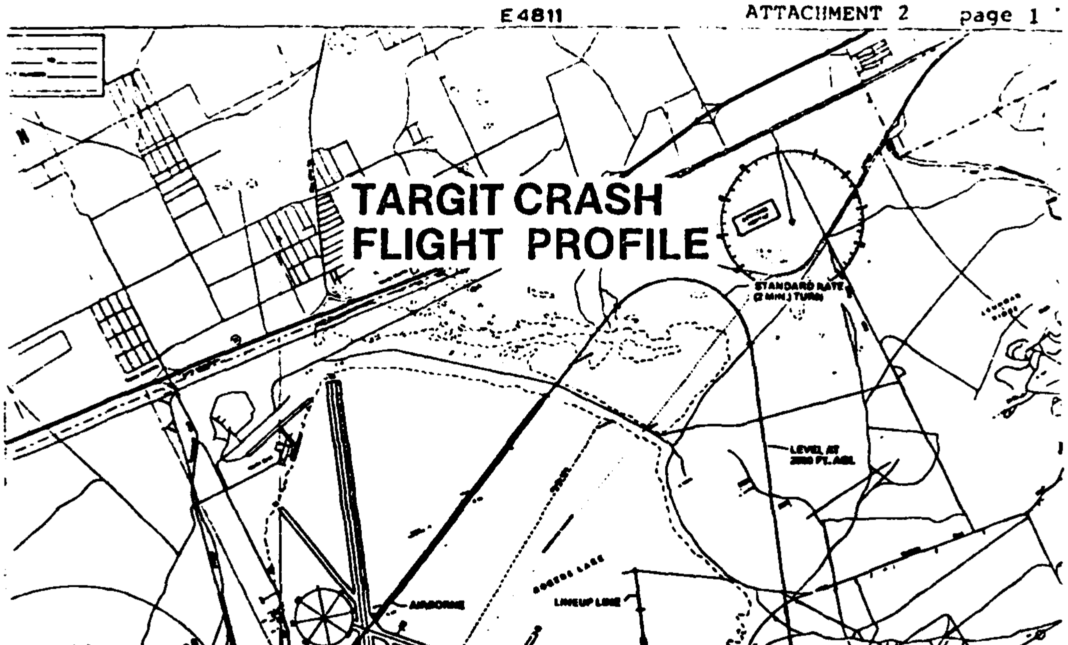


Figure 4
B-2



CID Impact Flight Profile
NASA
Takeoff
Airborne
NASA radar
Target site
Press site
Termination crash envelope
Planned 720 race track
1.4 nmi


TARGIT CRASH
FLIGHT PROFILE
STANDARD RATE
(2 MIN.) TURN
LEVEL AT
FT. AGL
AIRBORNE
LINEUP LINE
IMPACT
GLIDESLOPE
INTERCEPT
STANDARD RATE
(2MIN.) TURN

APPENDIX C

Letter, from John E. Reed, Jun 18, 1984

ATTACHMENT M

FULL-SCALE TRANSPORT CONTROLLED IMPACT
DEMONSTRATION PROGRAM

PRE-/POST-TEST ASSESSMENT/PHOTOGRAPHIC DOCUMENTATION
OF FAA CRASHWORTHINESS EXPERIMENTS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

FEDERAL AVIATION ADMINISTRATION

Full-Scale Transport Controlled Impact Demonstration Program

JUN 18 1984

Mr. John Gregoire
Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, California 91103

Dear Mr. ~~Gregoire~~ John:

Enclosed for your review and comment is a draft copy of Attachment M to the Full-Scale Transport Controlled Impact Demonstration (CID) Program's Photographic/Video Coverage Plan. This enclosure is an amendment to the plan in order to provide more definitive requirements relative to the pre-test and post-test still photographic coverage of the CID crashworthiness experiments.

In addition, it is intended that the following be added to Section 4.0 of <u>INTRODUCTION</u>: "(<u>NOTE</u>: Pre-test and post-test still photographic coverage of the Federal Aviation Administration's crashworthiness experiments is identified under Attachment M of this document.)"

Sincerely,

John E. Reed
Program Manager, Full-Scale Transport Controlled Impact Demonstration Program

Enclosure

ATTACHMENT M

FULL-SCALE TRANSPORT CONTROLLED IMPACT
DEMONSTRATION PROGRAM

PRE/POSTTEST ASSESSMENT/PHOTOGRAPHIC DOCUMENTATION
OF FAA CRASHWORTHINESS EXPERIMENTS

1.0 INTRODUCTION

In the assessment of performance associated with the FAA crashworthiness experiments supporting documentation shall be provided through the use of both pre-test and post-test still photographic coverage. This still coverage will be performed by the Jet Propulsion Laboratory and FAATC photo labs as a supplement to the actual impact coverage set forth under Section 4.0 of Photographic/Video Coverage Plan. The procedures provided herein identify these supplementary photographic requirements as they relate to the documentation and assessment of the FAA Crashworthiness Experiments which include the aircraft structure (and analytical model), seat/restraint system, stowage compartment/galleys, cabin fire safety, flight data and cockpit voice recorders and post-impact investigation analysis. These experiments are described in the CID Management Plan dated January 1984 (DOT/FAA/CT-82-151).

2.0 DOCUMENTATION TEAM

The pre- and post-test documentation team shall consist of the FAA Crashworthiness Program Manager and/or experimentors, Photo Documentation Director, one (1) or more still JPL/FAATC camera persons and up to three (3) technical persons associated with each of the identified experiments. The project manager will select these technical personnel who in turn will identify the structural areas of interest and the still photographic documentation needs. The still photo coverage and assessment of the post-impact investigation analysis experiment will be handled separate from the other crashworthiness experiments, since it involves an independent team

activity. Mr. Leo Garodz will be in charge of this activity which will include photo coverage by the FAATC photo lab to be accomodated after documentation of the other aforementioned experiments has been completed.

3.0 REQUIREMENTS/NEEDS

As part of the FAA Technical Center's crashworthiness program effort, many of the on-board experiments identified under the CID Management Plan (DOT/FAA/CT-82/151) have previously been supported by a considerable number of analyses, laboratory investigations and full-scale tests. The CID represents a final culmination of research as applied to the individual experiments and their assessed performance during the air-to-surface impact demonstration. In order to effectively assess the performance of each experiment element and compare the individual results with previous findings, it is necessary to fully document each of the experiments during the pre-test and post-test periods. As part of this documentation effort, photographic (still) coverage becomes of paramount importance. In this case, all photographic prints (unless otherwise specified) must be in color and 8x10 inches in size. The number of copies of each print required will be identified by the project manager or appropriate experimentor personnel. The following requirements, as associated with the still photographic coverage of each of the on-board FAA crashworthiness experiments, must therefore be adhered to.

3.1 STRUCTURE (Fuselage/Wing)

The CID Structural Experiment will involve a measure of fuselage/wing deformation and rupture as obtained from both on-board accelerometer/strain gage instrumentation and motion (and still) photography/video instrumentation located externally at the impact site. The documentation pertinent to the the impact occurrence itself, will be obtained under Section 4.0 of the Photographic/Video Coverage Plan. Additional pre-test and post-test still photography covered under this document will be used to identify and record structural deformation and failures at the fuselage and wing locations. Such information will be correlated with the aforementioned on-board instrumentation and high speed camera coverage, and subsequently applied to the analysis and prediction of appropriate structural failure mechanisms. Where required, some device must be used for scaling and/or orientation in the field of view. Personnel responsibility for the pre-test and post-test still photographic coverage are provided under the Documentation Team provisions of Section 2.0. The documented areas of fuselage and wing structure (both interior and exterior) will be selected by the project manager, experimentor and/or designated technical representative and will consist of, but not be limited to, the following:

3.1 INTERIOR

- o High resolution photographic (still) coverage of all structural accelerometer/and strain gage bridge instrumentation installations. One hundred eighty-seven (187) channels within the airframe fuselage and wing locations shall be photographed during both the pre-test and post-test activity. Location of these installations can be obtained from the CID Aircraft Data Measurements list.

o High resolution photographic (still) coverage of the interior aircraft shall include the cockpit/cabin/cargo areas and specifically instrumented bulkhead/splice joint locations, floor beam structure (above/below), and fuselage frame/stringer/skin attachment structure, as may be accessible during the pre-test and post-test periods. Photographic coverage of the specially designed five resistant windows shall also be included under this effort.

o High resolution photographic (still) coverage of the interior airframe areas should also be expanded during the post-test coverage to include additional documentation of any other deformed, ruptured, crushed and/or failed areas of fuselage and wing structure resulting from the impact occurrence.

3.1.2 EXTERIOR

o High resolution photographic (still) coverage of all external surfaces of the fuselage/wing structure particularly emphasizing bulkhead/-frame/floor areas, including exterior wing and engine/pylon structure, which are "marked" on aircraft per the grid identification provided under the Photographic/Video Coverage Plan.

o High resolution photographic (still) coverage of the exterior fuselage/wing surfaces per above should be extended during the post-test coverage to include additional documentation of any other deformed, ruptured, crushed and/or failed areas of the fuselage and wing structure resulting from the impact occurrence. Also, photographic coverage shall include the airplane deceleration path/ground scar to its final resting place (both ground and aerial photos) including component scatter, i.e. propulsion units, aerodynamic surfaces, etc.

3.2 SEAT RESTRAINT SYSTEM STOWAGE COMPARTMENT/GALLEYS

The CID Seat/Cabin Restraint System Experiments will involve a measure of performance associated with (25) standard and new concept design seat installations, (2) overhead stowage compartment installations, and (2) galley module installations located within the aircraft cabin. These measurements will be obtained through the use of installed accelerometers strain gages and load cell tensionometers (in the case of the seat belts) located on these test specimens, including the instrumented anthropomorphic dummies. As stated above, instrumented data along with on-board photographic/video coverage will be obtained during the impact occurrence. Additional photographic (still) coverage during the pre-test and post-test periods will be used to supplement and support data recorded in real-time during the impact. Where required, a ruler or some other device shall be used for scaling and/or orientation in the field of view. The crashworthiness program manager and technical designees will be paying

particular attention to the condition and position of each seat and dummy/-stowage compartment/galley structure before and immediately after the impact or as soon as access to the crash site is possible. Each of the experiments should be photographed in the undisturb position, and in the case of seats also after the dummies have been removed. After examination and photography (and after the subsequent accident investigation experiment has been completed) the test specimens shall be removed from the aircraft. Any damage to the specimens will be photographed again with the specimen oriented for optimum photo coverage. In the case of seats, the dummies should also be inspected and associated damage photographed. All the specimens will then be shipped to respective contractors and/or FAA facilities for further analysis.

Personnel responsible for documentatin of seat/cargo compartment/galley performance are defined under Section 2.0 Photographic Documentation will be directed solely at the interior cabin area and will consist of, but not be limited to the following:

3.2.1 SEAT/RESTRAINT SYSTEMS

o High resolution photographic (still) coverage of each of the (25) seat test specimens including all accelerometer (and load cell) installations (159 channels) shall be accommodated during both the pre-test and post-test period. As directed by the project manager, experimentor and/or designee, several photographs shall be taken of each specimen to account for their

individual location within the aircraft and appropriate views (front/rear/-side/top) to include instrumentation and dummy installation, as well as highly emphasized fitting-to-floor attachments. Note that all photos that should be marked are to correspond with appropriate seat test specimen. Post-test photos should include coverage with and without seat dummies. Location of the accelerometer/load cell installations can be obtained from the CID Aircraft Data Measurement List. Photographic coverage of fire-resistant seat covers shall also be included under this effort.

o High resolution photographic (still) coverage of the aforementioned seat/restraint systems during the post-test period should also include failures associated with each of the seat structures, instrumented and non-instrumented dummies, seat belts/shoulder harnesses, leg/floor attachment fittings including any floor and/or sub-floor damage, and bulkhead support failures (in the case of flight attendant seats).

3.2.2 CARGO COMPARTMENTS/GALLEYS

o High resolution photographic (still) coverage of each of the two overhead cargo compartments and two galleys (and internal contents) including respected accelerometer/strain gage instrumentation (6 channels) shall be accommodated during both pre-test and post-test period. The manner in which documentation is handled in the above seat restraint system experiment shall be similarily applied to stowage compartment/galley experiments. Again, all views including before and after deformation and/or failure effects should be photographed. Particular attention should be

given to attachment fittings and internal cargo of both compartment and galley modules. Location of installed instrumentation can be obtained from the CID Aircraft Data Measurement List.

o High resolution photographic (still) coverage of the aforementioned cargo compartment/galley experiment during the post-test period should also include failures associated with the attachment fittings and localized damage to ajacent bulkhead, floor and/or subfloor areas. Spillage and scatter of internal contents should be accounted for including the failure of latched doors and/or other designed restraining devices.

3.3 CABIN FIRE SAFETY

The cabin fire safety experiment represents a series of specially designed fire resistant windows and seat cushion covers within the cabin area. Photographic coverage will be included under the "structure and seat restraint system" portion of this document.

3.4 FLIGHT DATA AND COCKPIT VOICE RECORDERS

Experimental flight data nand cockpit voice recorders are installed on the aircraft in the aft cabin area and will be photographed under the "Post-Impact Investigation" portion of this document.

3.5 POST-IMPACT INVESTIGATION ANALYSIS

A post impact investigation experiment will be conducted after the aforementioned crashworthiness experiments are documented. The purpose of the accident investigation experiment will be to assess the adequacy of current forms and investigation procedures particularly as they relate to current aircraft safety research needs. Photographic coverage will be conducted as part of a post-impact investigation team effort and will be independent from photo coverage of the above CID crashworthiness experiments. The photographic coverage should be such as to meet the needs of the Investigator-In-Charge (IIC) and his teams and team members. The major teams will include: Human Factors, Crashworthiness/Structures, Propulsion, Performance, and Operations Areas. The photographic team for this special task will report to and be under the direction of the IIC.

3.5 INTERIOR/EXTERIOR

o Photographic coverage shall include but not necessarily be limited to the following areas covering the B-720 aircraft: the airplane deceleration path/ground scar to its final resting place (both ground and aerial photographic), external structural deformation, aircraft structure and propulsion units/component scatter/damage, internal deformation/damage, including fire damage, structure damage, structures including individual seat legs, leg/floor track attachment fittings/areas, floor and sub-floor deformation/damage/failure.

o Coverage shall also include the Digital Flight Recorder (DFDR) and Cockpit Voice Recorder (CVR) installation as well as the Navy's deployable Flight Incident Recorder (FIC), and associated sensors which provide signals to the DFDR.

o Where material failures occur both detailed macroscopic and microscopic coverage is required for subsequent analysis as to failure mode and failure causal factors. Correlation means must be provided to identify the photographs with the component(s) photographed. Where required and possible, a ruler or some other device/means will be used for scaling and/or orientation in the field of view.

o Unless otherwise directed all photographic prints will be in color and 8x10 inches in size. Approximately 5 prints will be required of each items photographed. A turn-around time of 24-hours or less will be required between photographing and print availability. All photographs will be suitably identified by the Photographic Laboratory and turned over to the IIC or his designated representative. Photographic prints should be of such quality as to permit detailed analysis by technical personnel, where necessary, slide and viewgraph preparation, and for final report inclusion.

4.0 SCHEDULE

Engineering assessment and documentation to include still photographic coverage of the FAA Crashworthiness Experiments shall begin immediately after the fire containment and security of aircraft have been achieved. As provided under the CID Post-Impact Ground Operations Plan, this activity shall follow the generalized documentation of aircraft damage and the removal of on-board cameras as provided under Attachment K of the Photographic/Video Coverage Plan. In addition, the aforementioned photographic activity shall precede the Post-Impact Investigation Experiment and be independent of photo coverage involved in the investigation. See Table 1 for the sequence of scheduled activities as defined under the CID Post-Impact Ground Operations Plan.

TABLE 1

CID POST-IMPACT GROUND OPERATIONS

ACTIVITIES	RESPONSIBILITY	OPERATING PERIOD
IMPACT	CID TEAM	T-0
CRASH FIRE RESCUE	USAF	T+1 MIN. thru 30 MIN.
SECURITY	USAF/NASA	T + DURATION
SAFING	NASA	T+30 MIN. thru 1/2 DAY
CAMERA/FILM REMOVAL	NASA/JPL	T+30 MIN. thru 1/2 DAY
AMK EXPERIMENT DOCUMENTATION	FAA/JPL	T+1/2 DAY thru 2 DAY T+9 DAY thru 10 DAY
CRASHWORTHINESS/FIRE SAFETY EXPERIMENT DOCUMENTATION	FAA/JPL	T+1/2 DAY thru 3 DAY T+9 DAY thru 10 DAY
POST-IMPACT INVESTIGATION	FAA	T+4 DAY thru 8 DAY
EXPERIMENT/EQUIPMENT REMOVAL	FAA/NASA	T+11 DAY thru 15 DAY
720 CARCASS REMOVAL	FAA	T+15 DAY thru 29 DAY
SITE CLEAN-UP	USAF	T+30 DAY thru 37 DAY

APPENDIX D

CONTROLLED-IMPACT DEMONSTRATION (CID) POST-IMPACT - INVESTIGATION EXPERIMENT (TEST PLAN)

CONTROLLED IMPACT DEMONSTRATION (CID)
POST-IMPACT - INVESTIGATION EXPERIMENT
(TEST PLAN)

1.0 BACKGROUND

During late summer, 1984, a typical four engine jet will be subjected to a Controlled Impact Demonstration (CID) from a predetermined altitude at the NASA-Ames/Dryden Flight Research Facility.

The primary purpose of the Controlled Impact Demonstration will be to evaluate the fire retarding qualities of antimisting kerosene (AMK). Other experiments, include crashworthiness activities associated with fire safety, the analytical modeling of aircraft structure and demonstrated performance of cabin and new concept seat restraint systems. In addition, a post-impact investigation experiment will be conducted and is the subject of this document.

2.0 POST-IMPACT INVESTIGATION EXPERIMENT

The post-impact investigation experiment will be conducted after the AMK and crashworthiness experiment evaluations have been completed. The purpose of the post-impact investigation experiment will be to assess the adequacy of current NTSB investigation forms and procedures particularly as they relate to current aircraft safety research needs.

In support of this experiment effort, and in accordance with the CID Post-Impact Procedural Requirements, an independent team will be formed to perform the investigation and an associated impact analysis. The investigation will involve a detailed systematic examination of the aircraft and its associated systems. The impact analysis will provide for an indepth comparison of performance between the investigative results and CID crashworthiness experiment results, based on recorded data.

3.0 CID PROGRAM POST-IMPACT REQUIREMENTS

As set forth under the CID Post-Impact Ground Operations Plan (Table 1), the aircraft wreckage will be under the jurisdiction of NASA-Ames/Dryden and the U.S. Air Force. Their responsibility is to extinguish any fires that may occur after the impact and secure the area. The fire department has a halon truck with a bayonet that will be available in the event that interior fire erupts. The bayonet would then be rammed into the fuselage and the halon discharged directly into the cabin. If the aforementioned scenario occured and a bayonet equipment truck were not available, the entire interior and contents could be consumed by fire and compromise the experiments.

After any fires have been extinguished, the next step will be delethalize the aircraft and impact area. This will be accomplished by the Assistant Fire Chief and other NASA-Ames/Dryden support personnel. The delethalization will include such items as checking for and removing fuel puddles, trapped fuel in the aircraft, ensuring that the aircraft and experiment batteries are turned off and disconnected, deflating all tires, if possible, and removing or discharging all high pressure bottles.

Security will be immediately established by the USAF. A personnel access list will be identified under the CID Post-Impact Procedural Ground Operation Requirements. Only those listed on the access list will be admitted to the impact/wreckage area.

Following delethalization, the first order of business will be a separate JPL photographic documentation of the CID experiments as defined under the CID Post-Impact Procedural Requirements. This effort will be preceded by the removal of on-board cameras, retrieval of the Navy FIR, etc. It will include primary experiment assessment/photographic documentation by selected CID team experimenters. Upon completion of this documentation, the post-impact investigative experiment will begin followed by the removal of aircraft and site clean-up.

4.0 POST-IMPACT INVESTIGATION EXPERIMENT REQUIREMENTS

4.1 INVESTIGATION RESPONSIBILITY

The post-impact investigation experiment will be under the jurisdiction of the Project Manager, Mr. Leo Garodz, ACT-330. Mr. Frank Del Gandio, ASF-100, will be the Investigator-In-Charge (IIC)/coordinator. Ground rule: No CID team member or interested party connected with the CID program, except Mr. Garodz, shall participate in the post-impact investigation experiment.

The post-impact investigation coordinator's prime responsibility will be the control and safety of personnel and will be addressed later in this document. The second responsibility of the coordinator concerns the identification of any evidence related to the impact which may be useful to the investigation team. Notwithstanding that the CID team experimenters will have previous access to the aircraft, it is absolutely imperative that proper coordination and control be exercised in order to ensure investigative experiment personnel safety and preclude further damaging any equipment or altering evidence. It is also imperative that the selected investigation team members work with one another in the spirit of harmony and cooperation in order to have a successful and safe investigation.

4.2 INVESTIGATIVE TEAM

Investigative Team personnel will be selected on the basis of expertise, i.e. crashworthiness, fire safety, etc. Their prime objective will be the documentation and preliminary analysis of aircraft damage. The extent of investigative team documentation will be determined by the degree of fuselage deformation.

4.2.1 - The Human Factors Team will document the survival aspects of accident, taking into acount fuselage deformity, occupable volume of cabin, seat/dummy damage, availabity of access routes, jammed exits etc. In addition, the Human Factors Team responsibility will extend to the overall experiment "Impact Analysis" objective as described under Section 4.5.

4.2.2 - The Systems Team will start their documentation outside the fuselage. The Systems Team will not be allowed to enter the fuselage for cockpit documentation until the cockpit seat condition have been fully documented.

4.2.3 - The Structures Team will be allowed into the fuselage to work in the areas that have been completed by the Human Factors Team.

4.2.4 - The investigation of the fuel system normally falls under the Powerplant Group. They properly document and describe the sequence of events and associated damage. This team will be headed by a powerplant team leader.

4.2.5 - Mr. Frank Del Gandio and Mr. Leo Garodz will make a wreckage distribution chart. Mr. Frank Del Gandio will prepare a brief maintenance records/aircraft history.

4.2.6 - The group chairmen will be responsible to ensure proper photographic documentation of their respective post-impact investigative assignments. Each group will have a placard that will be utilized in each photo for identification purposes.

No equipment, components, or parts, excluding project cameras and seats are to be removed from the aircraft without the permisison of Mr. John Reed and/or CID experimentors. The coordination for removal will be coordinated between Mr. Reed and respective experimentor project managers. The equipment unless authorized by experimentors.

4.3 PHOTOGRAPHY SUPPORT

The post-impact investigation experiment will include separate FAATC "still" photographic support. These investigative personnel and associated photographers will be independent of the CID team and photographic staff. With respect to the post-impact investigation team photographic needs. Three photographers will be required. Photographer number one will immediately start at the point of impact and photograph all ground scars and wreckage distribution up to the final resting place of the fuselage and associated scattered components. Mr. Leo Garodz, ACT-330, will direct the photographer. Some airborne coverage from a helicopter will be required. Photographer number three will be assigned to the structures team and will commmence photographing both the interior and exterior of the aircraft under the direction of Structure Team Leader. When the photographic coverage of the interior movie camera installations is completed, the number two photographer will remain with the Human Factor Team leader and start the seat and anthropomorphic dummy photographic documentation. The number two photographer will remain with the Human Factors Group until the Human Factor Team leader is satisified that he has all the photographs he needs of the seats and other related information. The number one photographer will be assigned to the Powerplants Team as soon as he has completed photographing the ground scars and wreckage distribution. After the exterior of the engines are documented, photographer one will divide his time between the Systems Group and the Powerplants Groups.

4.4 FLIGHT DATA RECORDER SUPPORT

Mr. Leo Garodz, who has responsibility for the flight data recorder and cockpit voice recorders experiments will remove the four flight data and cockpit voice recorders for subsequent readout and analysis.

1. Fairchild - to be read out on the scene with assistance of Fairchild.

2. Lockheed - turned over to Mr. Grahm Leroy for read out by Lockheed.

3. Sundstrand - turned over to the Sundstrand Corp. for processing.

4. United Technology - to be turned over the Mr. Steve Lund for re. McDonnell Douglas at their Long Beach facility.

4.5 ANALYSIS

As previously discussed, the Human Factors Group will document the "survival aspects" of this "accident". However, in addition, they will also provide a separate "Analysis Report" which describes all technical aspects affecting "occupant" survival. This analysis activity is directed at satisfying the primary objective of the Post-Impact Investigation Experiment, namely to compare the team results with CID experiment results and the adequacy of existing investigative procedures. To accomplish this, the group must cover the aircraft kinematics as follows: Describe the velocity and attitude of the aircraft at impact and the sequence of obstacle impacts (e.g. wing "can-openers") and component separations. Coordinate with the Structures and Performance Groups for the following information.

a. Horizontal velocity (ground speed) fps
b. Vertical velocity (rate of descent) fps
c. Terrain angle, degrees
d. Flight path angle, degrees
e. Impact angle, degrees
f. Attitude at impact, degrees
    Pitch angle
    Roll angle
    Yaw angle
g. Determine magnitude of velocity components: parallel to the impact surface, fps, and perpendicular to the impact surface, fps.
h. Determine stopping distance (gorge marks): parallel to impact surface (aircraft crushing longitudinally or structural collapse and ground scars) ft; perpendicular to impact surface (structural collapse perpendicular to longitudinal aircraft axis and depth of ground scars) ft.
i. Determine longitudinal, vertical and lateral acceleration load factors, in "g's", resultant load factors, as a function of time, using techniques recently developed by Mr. John Clark of the NTSB.

In accordance with the objective of the Accident Investigation Program, a cross-correlation analysis will be conducted between the data acquired by this investigatory group and the data acquired from the on-board basic experiments involving crashworthiness and human factors areas. A report will be prepared on this analysis and include substantial conclusions and recommendations.

The Fairchild CVR will be turned over to Fairchild where the tape will be transcribed.

The Human Factors Team will document and photograph the seats to the extent possible without removal from the fuselage. Cockpit seat documentation will be first in order to make the cockpit available for the systems team.

NOTE: The safety of the investigating team is of paramount importance. Normal desert temperature will be around 120°F, which will put the temperature around 140° on the desert floor. Everyone is to come prepared with long sleeve shirts and hats to shield the sun. ASF-100 will supply suntan lotion and maintain an adequate water supply at the scene. In addition to a hostile environment, the damaged aircraft presents another set of hazards such as jagged metal, broken glass, frayed wires, etc., to name just a few. ASF-100 will supply protective gloves and other necessary items for the investigation. The post-impact investigation team members will not be permitted to leave/break away from this particular experiment until formally released by the IIC, as during an actual "accident" investigation.

APPENDIX E

INTEROFFICE MEMORANDUM
FROM: Review Board
SUBJECT: Controlled Impact Demonstration Readiness Review
15 August 1984

J. Gregoire

JET PROPULSION LABORATORY INTEROFFICE MEMORANDUM

RLP:bm-0001M

TO: R. Stephenson, Manager, Div. 34 DATE: 15 August 1984
J. E. Fuhrman, Manager, Div. 64
W. H. Spuck, Manager Technology Utilization Program.

FROM: Review Board

SUBJECT: Controlled Impact Demonstration Readiness Review.

The Review Board met at 8:30 a.m. on August 2, 1984 to review JPL's readiness for participation in the upcoming full-scale transport aircraft Controlled Impact Demonstration (CID).
John Gregoire is responsible for ground photography and described preparation for that task. A major change in photographic coverage, which has developed as plans for the CID have progressed, has been the removal of manned camera locations to yet to be designated locations from the crash site. This has placed almost total reliance for photographic coverage on unmanned photography. Also, the uncertainty of the CID date is making it difficult to assure the availability of personnel and equipment.

The adequacy of IR camera coverage for detection of ignition sources was discussed. Sarohia claimed that IR coverage was not required by the contract and was not needed for detection of ignition sources. It was agreed, however, that IR coverage would enhance the identification of hot spots. Larry Montgomery will support V. Sarohia in looking into the possibility of JPL providing more IR coverage, and appropriate recommendations will be made to the FAA.

Activation of the unmanned camera is planned to be provided by RF signal. It was recommended by all Board Members that a backup camera activation system be provided. During discussion of the photographic procedures it was noted that photographic backup to John Gregoire is available and has been briefed, but that the procedures had not been documented. Documentation of the photographic procedures, before, during and after the test were recommended. After the Review, Montgomery suggested that the procedure be dry-runned and checked out with the backup personnel prior to the test.

In summary, the JPL team has prepared themselves well for their support of the CID. The Board had some concerns, however, and these together with the recommended actions are summarized in the Attachment. Specific concerns and recommended actions by each Board Member are available from the Review Board file maintained by W. Menard.

JPL READINESS REVIEW
SUMMARY OF CONCERNS AND RECOMMENDATIONS

CONCERNS

1. Activation of unmanned ground camerss is planned to be provided by RF signal. No verification of activation or backup is planned.

2. Backup photographic personnel have not been provided with a schedule or checklist of photographic procedures.

3. Removing manually operated camera positions so far from the crash scene jeopardizes backup capabilities as well as flexibilities of ground camera coverage.

4. Need for increased IR photographic coverage to detect ignition sources and hot spots.

RECOMMENDATIONS

1. Provide backup activation for the unmanned ground camera systems.

2. Provide documentation of photographic procedure, including a schedule, for use by backup personnel, and dry run the procedure prior to the test.

3. Attempt to resotre manned photographic stations as close to the crash site as safety will allow.

4. Investigate the possibility of JPL providing increased IR photographic coverage, and recommend appropriate action to the FAA

CID PHOTOGRAPHY

PHOTOGRAPHIC SUPPORT TO CID PROGRAM

Jet Propulsion Laboratory -	Pasadena, CA.
Vandenberg Air Force Base -	Vandenberg, CA.
Naval Weapons Center -	Pt. Magu, CA.
Naval Surface Weapons Center -	Dahlgren, VA
Ames/Dryden Research Center -	Edwards, CA.

FILM PROCESSING SUPPORT

Hollywood Film Enterprizes	Hollywood, CA.
Foto-Kem	Burbank, CA.
Newell Color Lab	Burbank, CA.
Jet Propulsion Laboratory	Pasadena, CA.
Foto-Tronics	Burbank, CA.

APPENDIX F

FULL-SCALE TRANSPORT CONTROLLED IMPACT
DEMONSTRATION PROGRAM

PHOTOGRAPHIC SUPPORT

FULL-SCALE TRANSPORT CONTROLLED IMPACT DEMONSTRATION PROGRAM

PHOTOGRAPHIC SUPPORT

JOHN D. GREGOIRE
JET PROPULSION LABORATORY
CALIFORNIA INSTITUTE OF TECHNOLOGY
OCTOBER 1983

PAINT

A PHOTO WAS TAKEN OF A NEARLY NEW PAINT JOB OF THE 747 AT DRYDEN. AT THAT SAME TIME A PHOTO WAS TAKEN OF THE 720, WHICH HAS OLD WHITE PAINT WITH RED TRIM.

MID - FUSELAGE CAMERA

CAMERA WAS TO BE MOUNTED MID-SECTION OF EXTERANL FUSELAGE TO SHOW THE NAVY's BRAKE AWAY FLIGHT RECORDER

IT WAS DECIDED BY THE TEAM MEMBERS THAT IT WOULD BE MORE PRODUCTIVE TO USE A GROUND BASE PHOTO UNIT TO GET THE PHOTO INFORMATION.

NO CAMERA IS PROPOSED AT THIS TIME

jpl

TAIL CAMERA

CAMERA TO BE MOUNTED EXTERNAL ON THE VERTICAL STABILIZER - TOP LEADING EDGE TO SHOW AMK FUEL DISBURSEMENT AND FUSELAGE DISTORTION

CAMERA

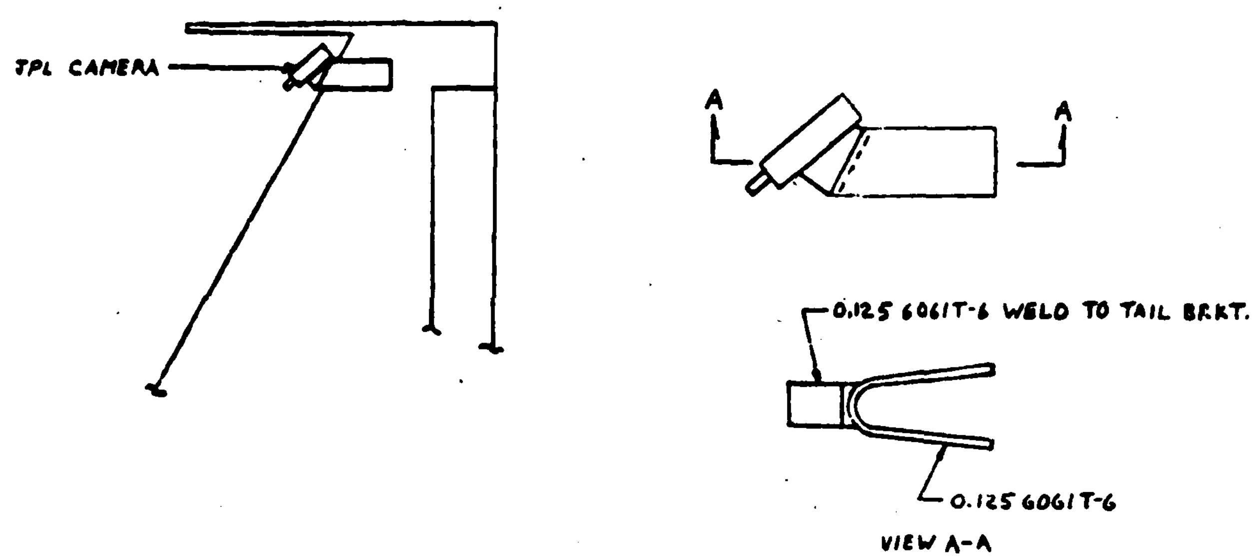
PHOTO SERVICES:	16MM 1VN 200 FEET DARK ROOM LOAD MAGAZINE
SUGGESTED CAMERA SPEED:	200 FPS
RUNNING TIME:	200 FPS - 40 SECONDS
LENS:	NEEDED 80 DEGREES COVERAGE - APPROXIMATELY 6MM LENS COVERAGE WILL INCLUDE ALL FOUR ENGINES - PLUS NOSE AND FUSELAGE
BATTERY:	30 VOLT PACK- 30 AMP HOUR IN CASE (60 LBS)
UP-LINK COMMAND:	TURN ON 10 SECONDS BEFORE IMPACT

THE CAMERA WILL BE INCASED IN A FIRE RETARDENT BLANKET FOR HEAT AND MOISTURE PROTECTION

NASA National Aeronautics and Space Administration

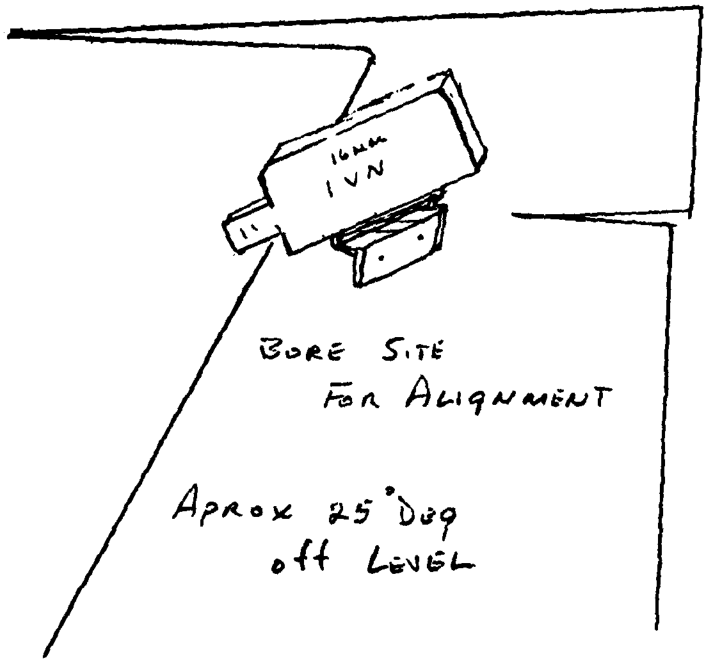
FLIGHT OPERATIONS ENGINEERING SKETCH NO.______ SHEET 1 OF 1

☐ CHANGE ☒ NEW DWGS AFFECTED	DESIGNED	DATE	APPLICATION CID 720
TITLE TAIL CAMERA	DRAWN		W.O. NO.
REASON	APPR'D		J.O. NO. P34-02A



fab	part number	add	rem	chg	instructions or part disposition

PHOTO -SONICS
MODEL 16mm-1VN



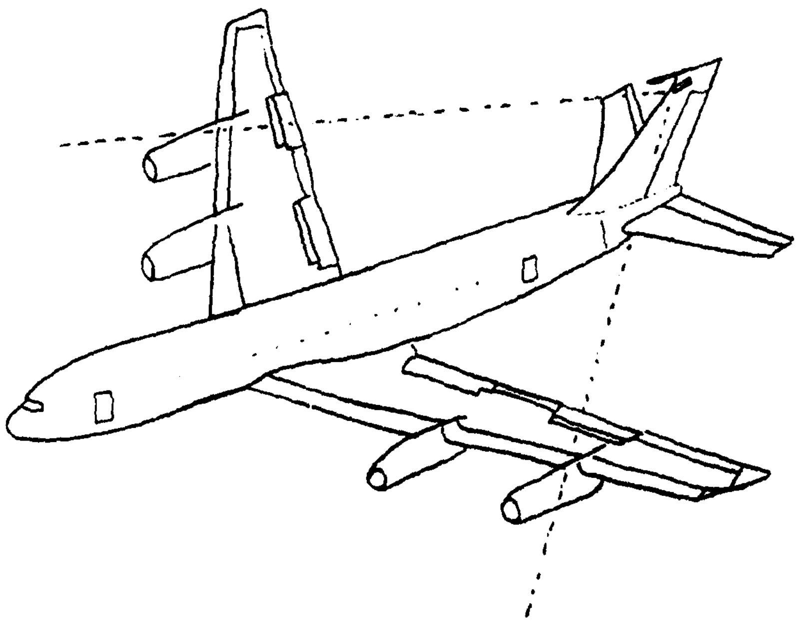


PHOTO -SONICS

MODEL 16mm-1VN

Standard specifications —

Frame rate:

16mm-1VN-100, pulse up to 12 pps., cine rates of 16, 24, 48, 64 and 100 fps.
Note: 200′ magazine, 6 pps. max.

16mm-1VN-200, cine rates of 24, 48, 64, 100, 150 and 200 fps.

16mm-1VN-50, pulse up to 8 pps.; cine up to 50 fps.
Accuracy ±1% or ±1 frame, whichever is greater.

Aperture size: .296″ x .552″.

Film specifications: Uses both .3000″ pitch (USA PH 22.5-1953) and .2994″ pitch (USA PH 22.110-1965), both 4 mil and 6 mil with no adjustments.

Film capacity: 65′, 100′ and 200′ magazines (using 4 mil film) plus 100′ daylight load using standard 6 mil film.

Film transport: Intermittent; two register pins and two pull-down pins with film held captive in aperture gate at all times.

Shutter: Fixed 120°; substitution of one fixed 9°, 18°, 36° and 72° available at no additional cost at time of purchase.

Shutter output pulse:

Pulse level: 1.5 V at 560 ohms load.

Pulse width: 50 μsec. at 200 fps. Will vary linearly with frame rate of camera.

Timing lights: Two LEDs, one each side of film outside picture area.

Motor: 28V DC, 2 amps at 200 fps.

Weight: 1.5 lbs. (camera body only)

Mounting: Top, bottom and side mounting provisions.

Lens mount: "C" (USA PH 22.76).

Heater: 28V, 100 watts.

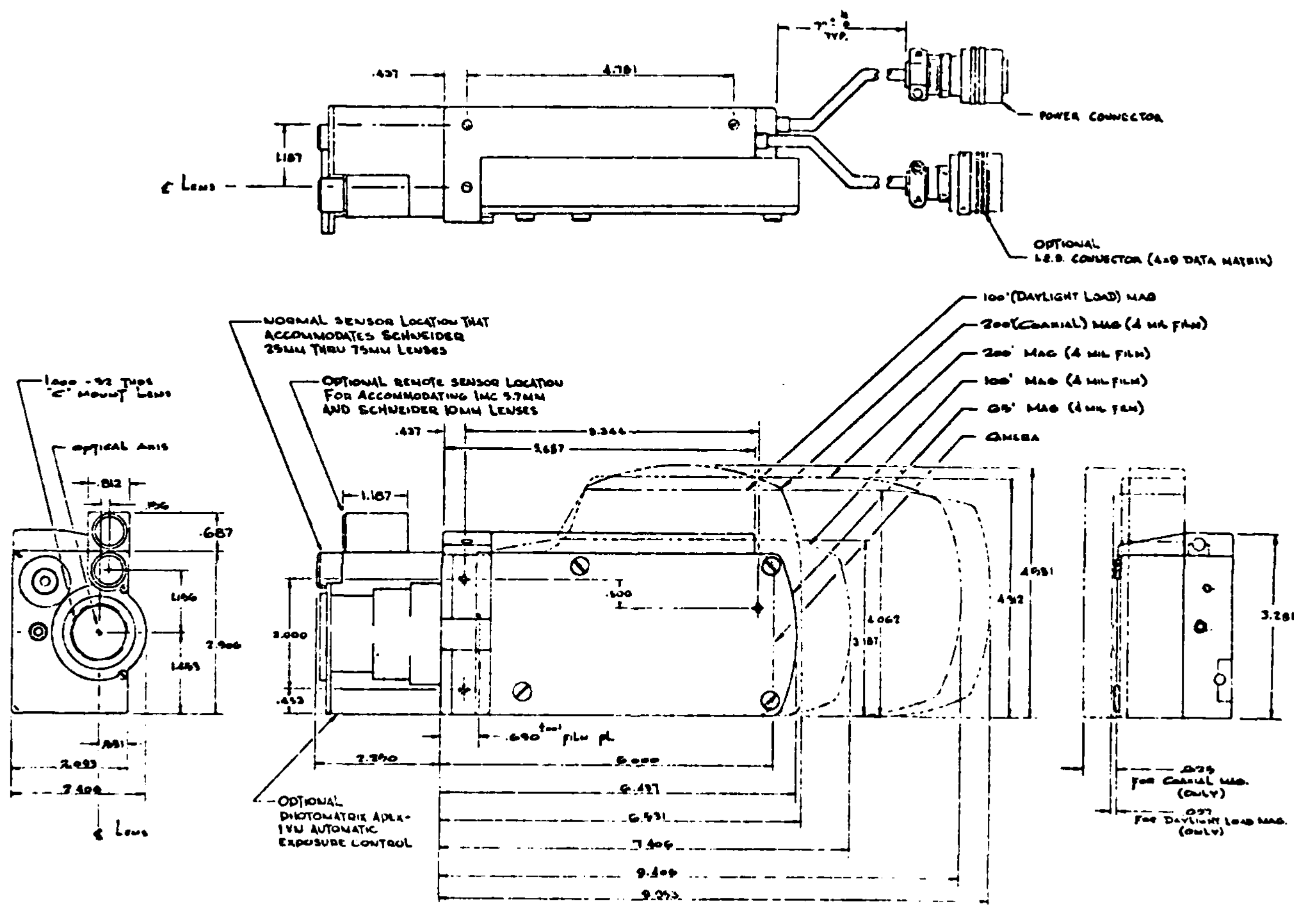
Weights:
65′ with film, 1.25 lbs.
100′ with film, 1.5 lbs.
100′ daylight load with film, 2.25 lbs.
200′ with film, 2.25 lbs.
200′ coaxial, with film, 2 lbs.

PHOTO -SONICS

MODEL 16mm-1VN

Outline drawing —

16mm-1VN-200:



jpl

NOSE CAMERA

CAMERA IS TO BE MOUNTED IN THE REMOVEABLE NOSE CONE WITH TWO TV CAMERAS TO SHOW THE SIMULATED VIEW PILOT THAT THE PILOT HAS DURING TEST

CAMERA

SUGGESTED CAMERA SPEED: 125 FPS - 400 FOOT MAGAZINE

LENS: 10MM <54 DEGREE COVERAGE>

CAMERA OPERATING POWER: MAX FPS - 28 VOLT - 24A SURGE - 12 CONTINUOUS

LENS: 10MM 54 DEGREE COVERAGE

BATTERY: 30 VOLT - 30 HOUR PACK

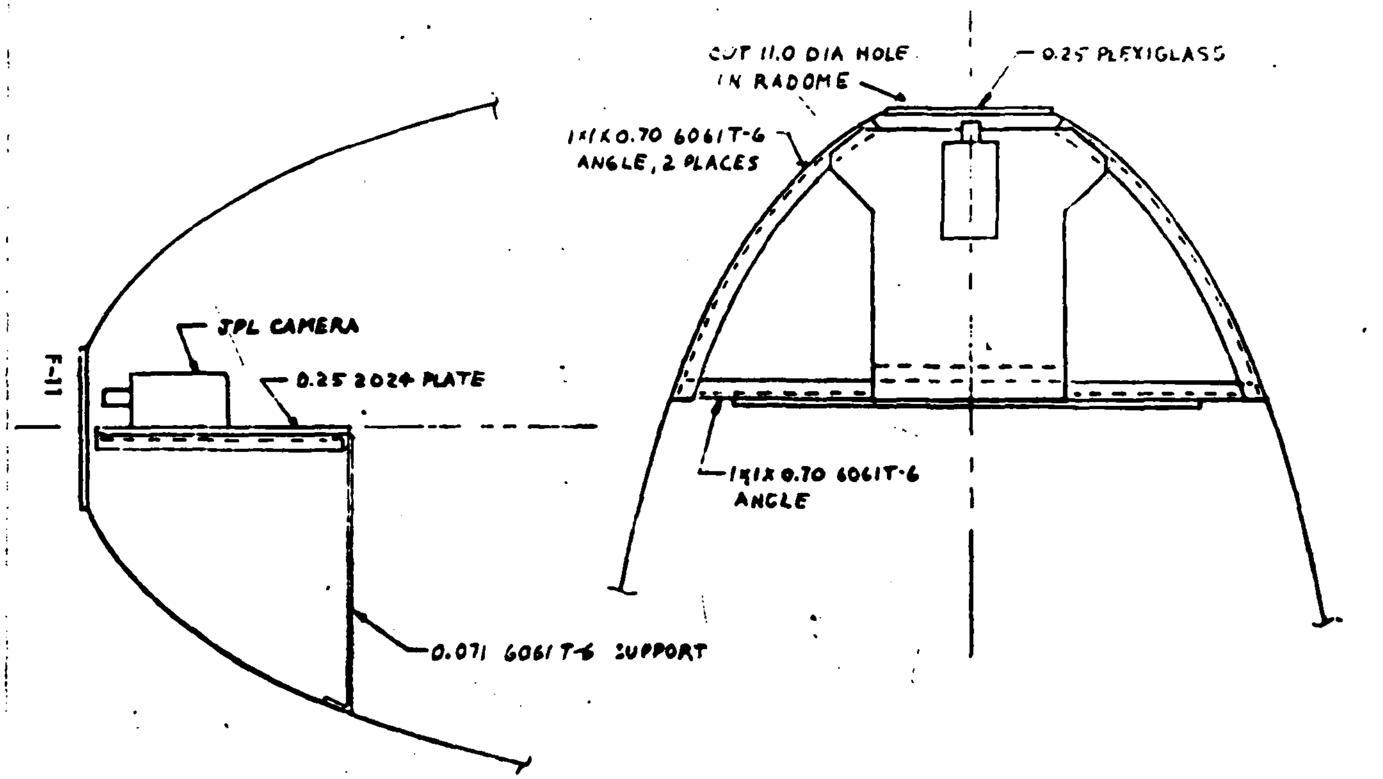
CAMERA RUNNING TIME: 125 FPS - 2 MIN 8 SECONDS

UP-LINK COMMAND: SIGNAL TIME - ACTIVATE NOSE CAMERA - 30 SECONDS BEFORE ESTIMATED IMPACT

NASA National Aeronautics and Space Administration

FLIGHT OPERATIONS ENGINEERING SKETCH NO. ______ **SHEET** 1 **OF** 1

☐ CHANGE ☒ NEW DWGS AFFECTED	DESIGNED	DATE	APPLICATION CID 720
TITLE NOSE CAMERA INSTALLATION	DRAWN		W.O. NO.
REASON	APPR'VD		J.O. NO. PJ402A



SIDE VIEW

TOP VIEW

fab	part number	add	rem	chg	instructions or part disposition

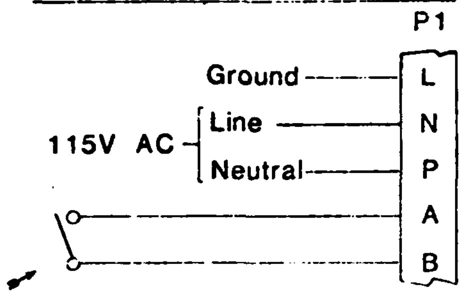
PHOTO -SONICS

MODEL 16mm-1P

Connector Wiring for User's Camera Cable.

REMOTE START

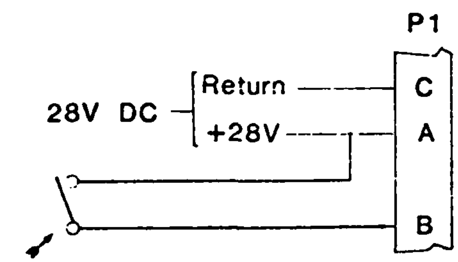
115V AC CAMERA



Remote start switch.

Voltage potential of any part of switch to earth ground is 115V.

28V DC CAMERA



Remote start switch.

Pulse camera requires momentary contact closure of 10 - 12 milliseconds duration for each frame.

P1

		P1
POWER INPUTS	28V DC — +	A
	28V DC — RETURN	C
	REMOTE START	B
	115V AC — LINE	N
	115V AC — NEUTRAL	P
	HEATER *	D
	HEATER *	F
TIMING SIGNAL INPUTS	INSIDE TIMING LIGHT — +	J
	OUTSIDE TIMING LIGHT — +	K
	INSIDE TIMING LIGHT — −	T
	OUTSIDE TIMING LIGHT — −	U
SHUTTER PULSE	SHUTTER PULSE — HI	E
	SHUTTER PULSE — LO	M
PHASE LOCK	PHASE LOCK INPUT — +	G
	PHASE LOCK INPUT — −	H
	PHASE LOCK REF. OUT, HI	S
	PHASE LOCK REF. OUT, LO	V
	REMOTE END OF FILM	R
	CASE GROUND — ⏚	L

PT06A-14-19S (SR)

Minimum contact rating for remote start switch is 50ma @ 28V DC.

* Heater voltage (28 or 115) is indicated on camera

PHOTO -SONICS

MODEL 16mm-1P

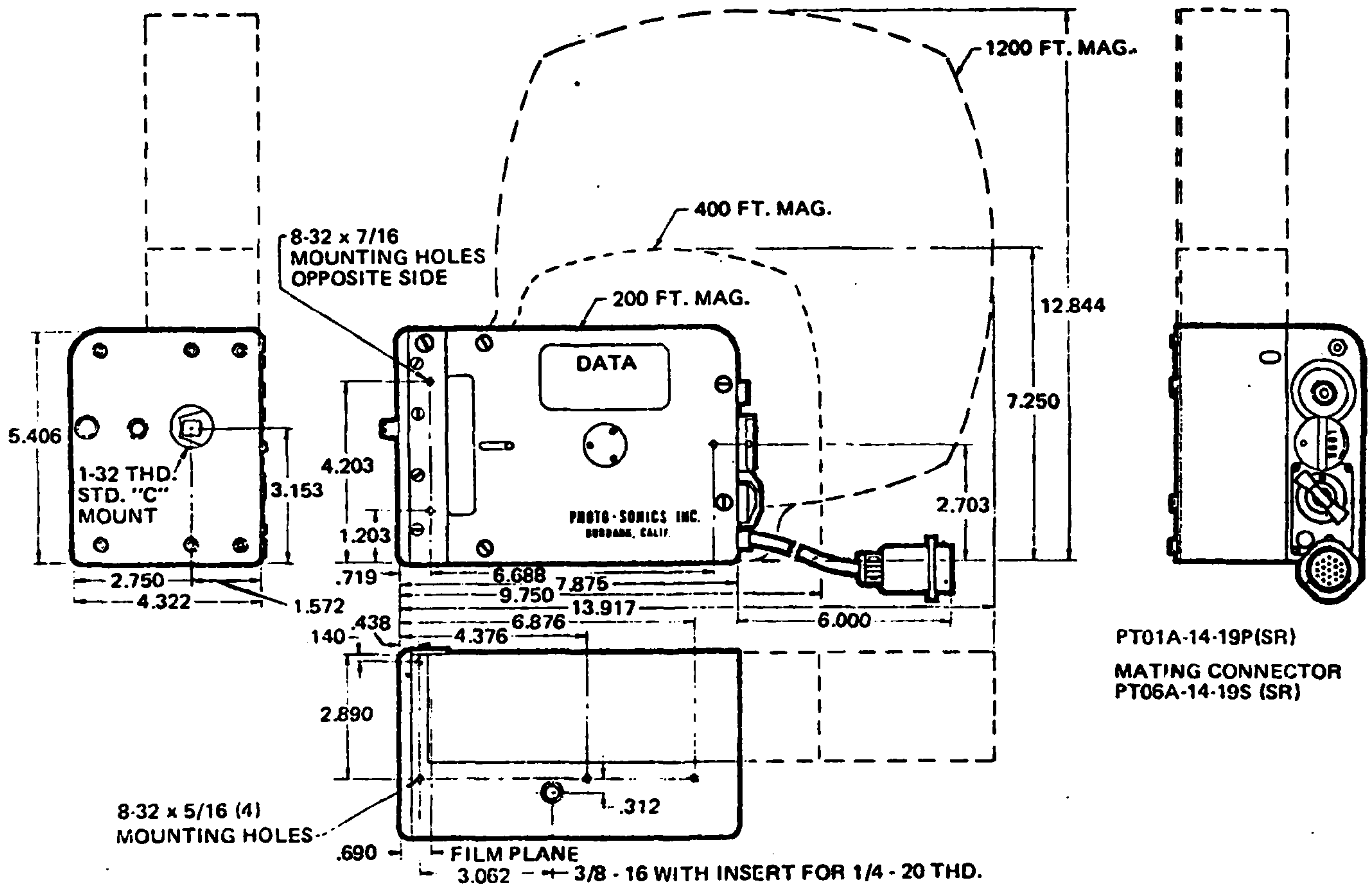
QUICK-REFERENCE SPECIFICATIONS

Frame rate.	10 to 500 frames per second (fps), infinitely variable. (400 fps maximum rate with 1,200-foot magazine.)
Frame rate accuracy.	±1% of frame rate setting, or ±1 frame, whichever is greater.
Film capacity.	200-ft., 400-ft. or 1,200-ft. daylight loading magazine.
Film.	16mm double-perforated. Either 0.3000" (long) pitch, (USA PH22.5-1953); or 0.2994" (short) pitch, (USA PH22.110-1965).
Timing lights. Standard front plate. Reflex front plate.	 LED (light emitting diode) – FLV-104. Neon – C9A (NE-2J). LED – MV 10.
Timing light offset.	Always a 13-frame displacement between timing light mask and camera aperture center when threaded per instructions.
Lens.	Type "C"; 1" diameter – 32 pitch thread, and 0.690" distance from lens seat to film plane.
Camera power. AC (Max fps). DC	115 volts, ±10V, 50 to 400 Hz; 5A surge & 3A continuous. 28 volts, ±4V; 24A surge & 12A continuous.
Fuse. 115V AC camera only.	Type: Microfuse 5A; Mfr. Littlefuse P/N 273005. Breaks power in AC operated cameras.
Connector for mating cable.	Type PT06A-14-19S (SR). See Figure 3 for wiring.
Weights. Camera body only. 200-ft. magazine. 400-ft. magazine. 1,200-ft. magazine.	 6 pounds. 5 pounds (with film). 8 pounds (with film). 15 pounds (with film).

PHOTO -SONICS

MODEL 16mm-1P

Outline Drawing of 16mm 1PL Camera and Magazines.



COCKPIT CABIN CAMERA

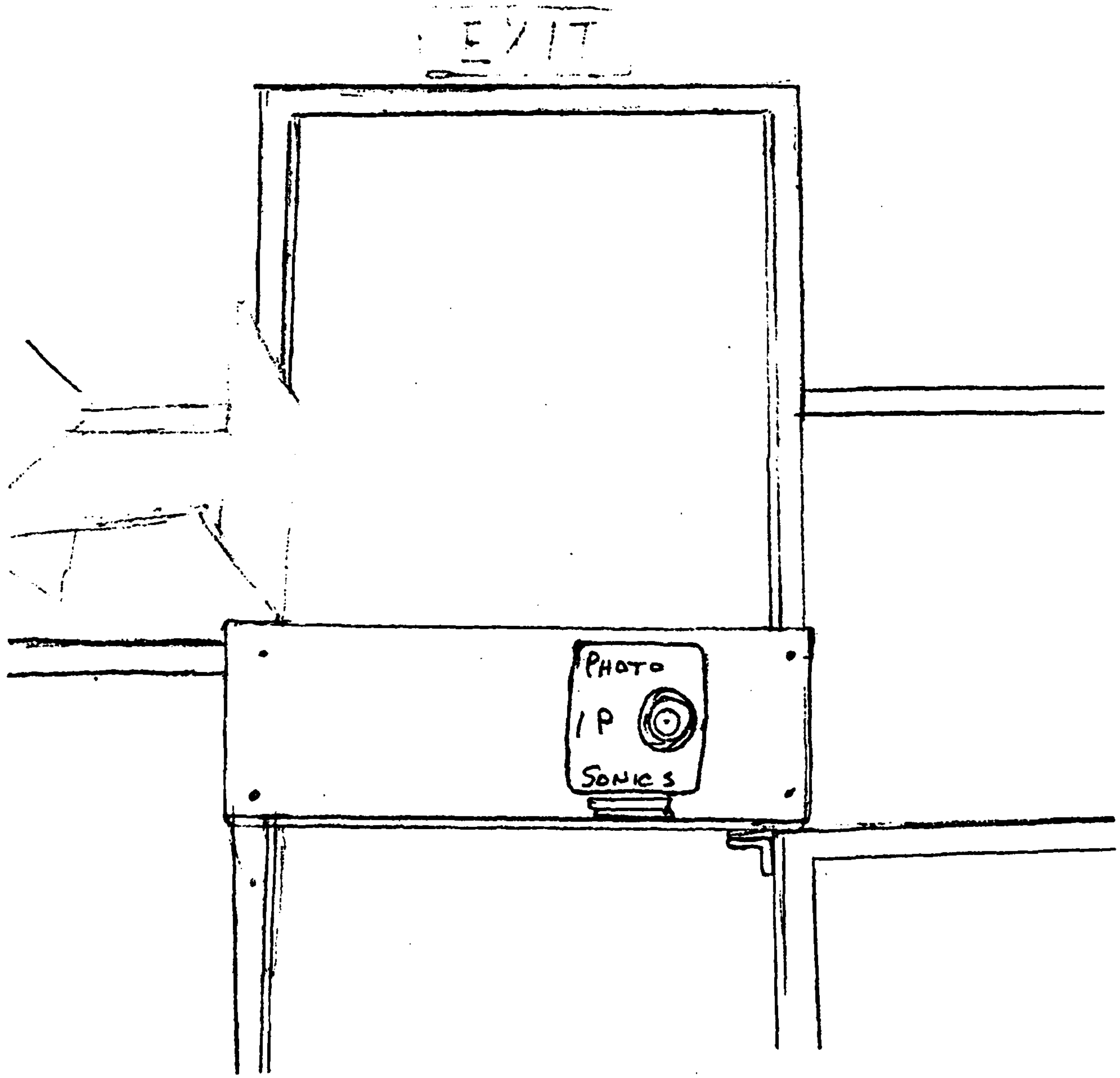
CAMERA WILL BE MOUNTED ON A BRACKET MOUNTED ACROSS OPEN DOOR WAY - APPROXIMATELY 40 INCHES HIGH TO SHOW PILOTS VIEW OF APPROACH

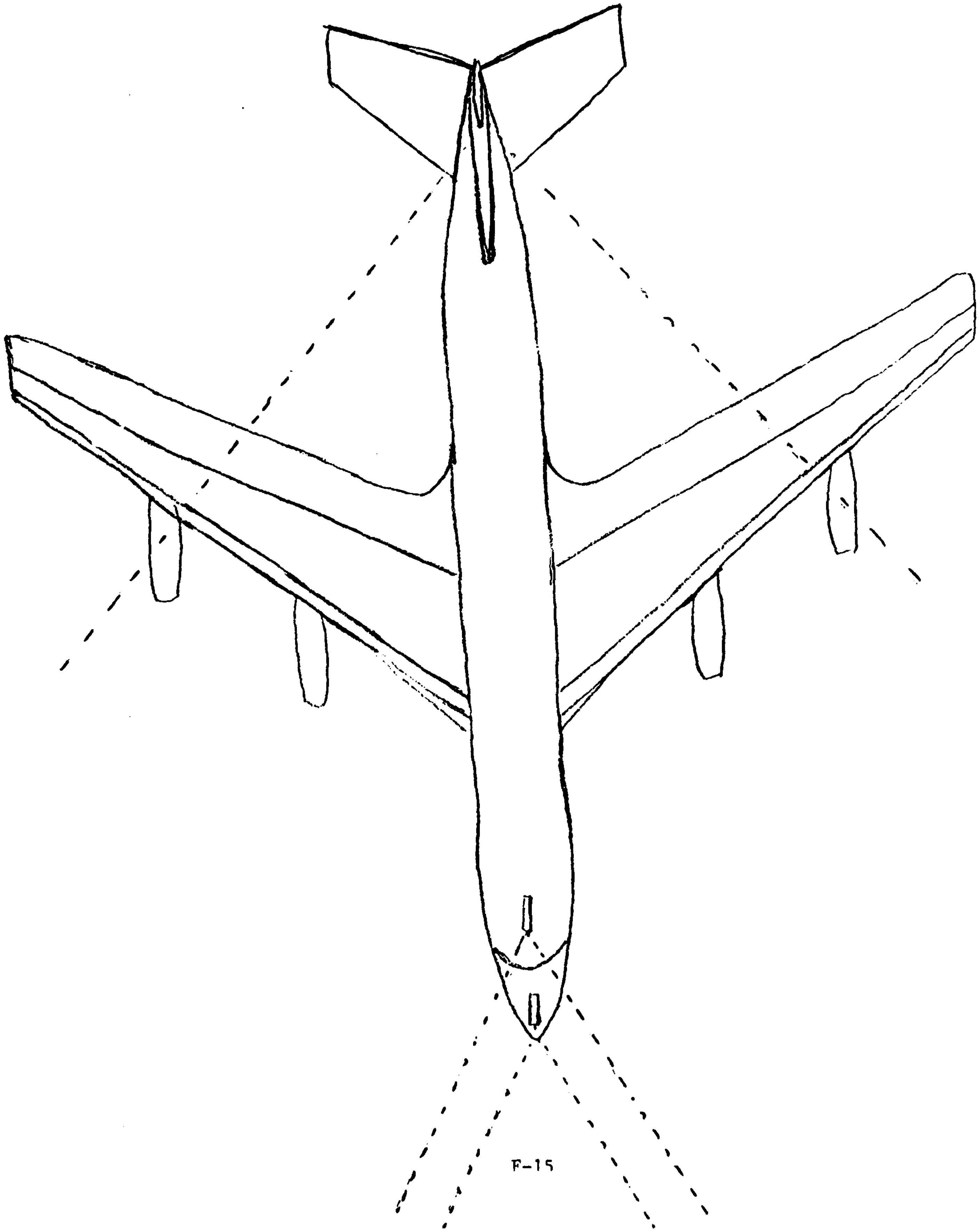
BORE SITE VIEWING WILL INCLUDE ONE THIRD HORIZON THROUGH WINDSHIELD VIEW

CAMERA

PHOTO SERVICES:	IP 16MM 200 FOOT LOAD MAGAZINE
SUGGESTED CAMERA SPEED:	200 FPS
CAMERA RUNNING TIME:	AT 200 FPS - 40 SECONDS
LENS:	10MM <54 DEGREE COVERAGE>
CAMERA OPERATING POWER:	MAX FPS - 28 VOLT 24A SURGE - 12A CONTINUOUS
BATTERY:	30 VOLT PACK - 30 AMP HOUR IN CASE (60 LBS)
UP-LINK COMMAND:	TURN ON 10+ SECONDS BEFORE ESTIMATED IMPACT

PHOTO -SONICS
MODEL 16mm-1P





F-15

APPENDIX G

HELICOPTER REQUIREMENTS

HELICOPTER REQUIREMENTS

Two helicopters were used for the C.I.D. test.

Taking up positions on either side of the test site the helicopters were moved with the 720 aircraft through approahc, impact, slide out, stop, and flame out.

Each helicopter carried a photographic crew consisting of one motion picture cmeraman and one still photographer. The cameraman had as their equipment a continental tension controlled camera mount, one 500-frame per second high speed motion picture camera and one 48-frame per second documentary motion picture camera. Each camera carried a 400 foot load of film (film stock 7291, color negative). The still photographers were equipt with motorized 35mm and 70mm still camera (color film).

The helicopters and their crews, the photographers, and all their photographic equipment, were set-up and ready for a full scale test three days prior to the assigned test date. For the exercise, the continental mounts were mounted in the helicopters. The motion picture cameras were attached to the continental mounts, each carrying a full load of film, and balanced with the cameraman in his seat and harness.

THe still photographers practiced with their dual mounted 35mm and 70mm motorized cameras. Shock cords were used to steady and secure the double camera set-ups from their fireing poistions within the helicopters

Helicopters and crews were on station two hours before C.I.D. take-off.

The plan for the photographic and video coverage was as follows:

Two helicopters will be needed for the C.I.D. test; one helicopter will be provided by the Army from ETS and the other from the Ames Research Center, Moffatt Field.

The helos will provide a low altitude elevated view of the crash site during the actual impact and later during the post-crash documentation phase of the operation.

From their staging areas at ETS the helos will proceed to their rendezvous positions at the C.I.D. site. They will leave just prior to break release on the 720 count down.

If no delay or hold has been called and the plane takes off, the Ames helicopter will locate itself 1,000 feet northeast of the impact site at a distance and altitude of 750 feet from the crash site. The Army helicopter will take a position directly opposite the Ames helo or the northwest side of the site. Both helicopters will make a follow-through move with the aircraft throughout the approach, impact, slide-out, stop, and flame-out. They will then hover at a safe altitude and distance (750 x 750) from the wreakage

to record the operation of the fire department and safety crew. Concern will be shown by the pilots not to hover so low as to allow the air movement they create to disturb the wreakage or the area that surrounds it.

Each helicopter will carry a photographic crew consisting of one motion picture cameraman and one still photographer. The cameramen will use a 500-frame per second Milliken high-speed motion picture camera with 50mm lens and an Arriflex M camera fitted with a motion control Dynalens and 50mm lens. Both cameras will be affixed to a continental tension controlled camera mount. The still photgraphers will use a 14-S motorized 70mm camera.

The helicopters will hover in place for approximately ten minutes, photographers will cover all aspects of the action on the ground showing that it is a survivable crash. The copters will then separate. The army will return to its original staging area to off load its photographic crew and their equipment, and pickup a video crew from the FAA . The Ames copter will stay at the site, fly back to the impact area, and film it, the path made by the slide out, the resting point and any wreakage and debris found along the way. They will then do a 360° circle around the 720 to show the entire crash scene.

When the Army copter returns to the site the Ames helicopters will have move northeast of the site, by some thousand feet, landed and be standing by for further instructions from NASA 25.

The Army copter and its video crew will enter the CID area at the south end at the aircraft's point of initial impact. They will trace the track left by the test vehicle as it slid over the ground to its final point of rest. Once there, they will perform a 360° turn aboutn the wreakage and record everything within that circumference. This should require no more than twenty minutes of flight time.

Once satisfied that they obtained the coverage required, they proceeded to station #21. There they landed and picked up all of the video tapes that were collected from the other stations and deposited there. This was organized by Photo Ops #1 and NASA #25. The Helo then flew to its original staging area, where Bill Tibbitts hand carried all of the video tapes to the JPL duping area.

APPENDIX H

Letter, FROM: John E. Reed, SUBJECT: INFORMATION: Full-Scale Transport Controlled Impact Demonstration (CID) Program--CID Ground Operations Plan
May 14, 1984
with

CID
CONTROLLED IMPACT DEMONSTRATION PROGRAM
GROUND OPERATIONS PLAN

DRAFT FOR SIGNATURE

13 JULY 1984

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FEDERAL AVIATION ADMINISTRATION
Full-Scale Transport Controlled Impact Demonstration Program

SUBJECT: INFORMATION: Full-Scale Transport Controlled Impact Demonstration (CID) Program--CID Ground Operations Plan

DATE: May 14, 1984

FROM: John E. Reed
Program Manager, Full-Scale Transport Controlled Impact Demonstration Program, ACT-300C

TO: Distribution

The subject plan is in progress of preparation by Roger Barnicki, NASA-Ames/Dryden Flight Research Facility (NASA-A/DFRF), and is a major coordination plan for pre- and post-impact site activites. The CID team members should identify those planned or anticipated pre- and post-impact activities for which each have specific responsibilities or participatory interests.

The types of plans or activities which will fold into the Ground Operations Plan include: The engineering Photographic/Video Coverage Plan, crash fire rescue (CFR), security, safing aircraft and experiment(s), removal of onboard camera film, experiment documentation, post-impact investigation plan, CID carcass removal, impact site clean-up, etc. Associated with each activity will be the identification of a responsible leader and team members (by name/organization) for appropriate badging and control at the impact site. For each activity, time lines are required which generally delineate a span of time to accomplish the task.

In general, the types of tasks and estimated times may be as follows:

Time-Days/Hours/ Minutes	Activity	Participants
T-14 days	Preliminary Photographic/Video Equipment Set-up	JPL
T-7 days	Initial Photographic/Video Equipment Tests	JPL
T-1 day	Final Photographic/Video Equipment Set-up/Tests	JPL

T-3 hours	Final film load, calibrations, etc.	JPL
T-0	Controlled Impact Demonstration	CID Team
T+1 min.	Extinguish fires	CFR
	Start photographic/video film removal (ground)	JPL
T+30 min.	Secure impact site through Slideout area	NASA/AF Security
	Safe aircraft and experiments (batteries, tires, etc.)	NASA/FAA
T+3 hours	Start onboard photographic/ video film removal	LaRC/JPL
	Start experiment photographic documentation	JPL
T+2 days	Complete experiment photographic documentation	JPL
T+3 to 7 days	Post-impact investigation	FAA
T+8 to 22 days	CID carcass removal and disposal	FAA
T+23 to 30 days	Impact site clean-up	NASA/AF

Your review, comments, and inputs are required by May 23 at NASA-A/DFRF to either Russ Barber or myself. As most of you will be at NASA-A/DFRF for Flight Plan C, we will have an opportunity to review inputs and discuss with Roger Barnicki.

#

Distribution:
Team Members
Test Management Council
ASF-100 (Frank Del Gandio)
Roger Barnicki, NASA-A/DFRF (ODFL)
Jet Propulsion Laboratory

DISTRIBUTION

FULL-SCALE TRANSPORT CONTROLLED IMPACT DEMONSTRATION PROGRAM

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CID

CONTROLLED IMPACT DEMONSTRATION PROGRAM

GROUND OPERATIONS PLAN

DRAFT FOR SIGNATURE

13 JULY 1984

GROUND OPERATIONS PLAN

FOR

CONRTROLLED IMPACT DEMONSTRATION PROGRAM

AT

AMES DRYDEN FLIGHT RESEARCH FACILITY

EDWARDS AIR FORCE BASE

Prepared by:

Roger J. Barnicki
CID Ground Operations Manager

Concurrences:

Russ Barber
NASA ADFRF
CID Project Manager

John Reed
FAA
CID Program Manager

Approved

Ronald S. Waite
Chief, Dryden Research
Flight Operations

Martin A. Kuntson
Director, Ames Research Center
Flight Operations

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1.2 SCOPE

1.3 FUNCTIONAL TASKS

1.4 DEFINITIONS

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2.1 GROUND OPERATIONS/CONVOY RESPONSIBILITIES

2.2 GROUND OPERATIONS/CONVOY ORGANIZATION

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3.2 OPERATIONAL READINESS

3.3 IMPACT SITE ACCESS CONTROL

3.4 SECURITY

3.5 FIRE DEPARTMENT

3.6 ENGINEERING PHOTO/TV COVERAGE

3.7 PAO MEDIA/PHOTO/TV COVERAGE

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5.1 TRAINING APPROACH AND SIMULATIONS

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CONTINGENCY/EMERGENCY OPERATIONS

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6.2 RESPONSIBILITIES

SECTION 1
INTRODUCTION

1.1 PURPOSE

The purpose of this document is to define the Controlled Impact Demonstration ground operations, CID Convoy composition, organization and responsibilities, and describe the convoy plan of operations. All other plans, other than the Flight Operations Plan, shall become part of the Ground Operations Plan. When any conflicts between plans are encountered the Ground Operations Plan shall be the governing document.

1.2 SCOPE

This plan applies to all NASA, NASA Contractors, FAA, FAA Contractors (ie JPL, TCI, GE), and AFFTC/DOD organizations providing support for the CID test and is scoped to pertain only to the personnel and equipment and the support thereof; which are required on site prior to impact for setup and test, CID impact test, post impact tests, and related activities.

All USAF/DOD support provided to NASA and FAA to meet the requirements of the CID Program will be per existing AFFTC documents, reglations and this plan. Deviations from the requirements of these regulations will be made only as detailed herein, and as agreed upon by AFFTC, NASA, and FAA.

1.3 FUNCTIONAL TASKS

a. CID Convoy - The primary function of the CID Convoy, through the Ground Operations Manager/Convoy Commander, is to provide and control all elements (except NASA 1 functions) of support required to participate in ground operations of the Controlled Impact Demonstration Test.

b. Local Area Control - The GOM/CC through the convoy provides for control of all personnel and on-site activities in the immediate area surrounding the impact site within the operational control area.

c. On-Site Coordination/Communications - Will be performed by the GOM/CC by utilization of the convoy control vehicle which will have the necessary communications capability to coordinate with NASA, FAA, JPL, and AFFTC/DOD elements that are providing impact and post impact operations.

d. Fire Supression and Control - Fire fighting personnel will be prepositioned at designated locations on the base and with the convoy. Once this team is activated by the On-Scene Commander, a senior fire officer directs this team in fire suppression as required in accordance with NASA/FAA test objectivies, AFFTC and USAF procedures. All personnel on this team, including the senior fire officer, will receive CID/720 aircraft peculiar fire, crash, and rescue training.

e. Post Impact Aircraft/Experiments Safing - The integrated operations and activities necessary to reduce any normal or abnormal hazardous conditions of the CID/720, or the area surrounding the CID/720, to an acceptable, "as safe as possible", situation for the completion of the pre-planned post impact tasks. Safing of the test article shall include the delethalization of cabin atmosphere, checking for and removing fuel puddles, trapped fuel in the aircraft, ensuring that the aircraft and experiment batteries are turned off or disconnected, deflating all tires, if possible, and removing or discharging all high pressure bottles.

NOTE: Minimum disturbance or movement of experiments, equipment, parts, pieces, etc. within the impact site and aircraft MUST be adhered to during all phases of aircraft/site safing.

f. Impact and Post Impact Photo Coverage - The FAA through JPL shall photograph the pre-test and test prior to impact, impact and through the entire slideout, and until the fuselage has come to rest. Post impact photo coverage will be by a special team of photographers supervised by the CID TV/Photo Documentation Director under the control of the Ground Operations Manager/convoy commander.

g. CID TV/Photo Documentation Director - The TV/Photo documentation director shall manage the Impact Site Documentation Team and coordinate all requests for documentation.

h. CID/720 Impact Test Site Documentatiom Team - Documentation of the CID/720 impact site, Aircraft damage and associated AMK/Crashworthiness experiments shall begin immediately after fire containment, with clearance from the Ground Operations Manager/Convoy Commander. A three person team will be utilized for this task and consist of; one motion picture cameraperson, one still photo cameraperson, and one video cameraperson. Coverage by the documentation team of areas of damage to the interior and exterior of the aircraft shall be by direction of the CID TV/Photo Documentation Director as requested/instructed by the CID Documentation Research Team or the FAA Post-Impact Investigation Experiment Team Investigator-In-Charge(IIC)/coordinator. A general documentation shall be followed by (Impact + 3 HRS) a detailed documentation under the direction of each CID experiment project manager, ie. AMK, Crashworthiness, etc. and the CID TV/Photo Documentation Director.

i. CID Documentation Research Team - A research team of two (2) people (one FAA; one NASA LaRc), shall identify (General Documentation, Impact +30 MIN to Impact +3 HRS) to the CID TV/Photo Documentation Director the post-test areas, of research interest, to be documented. Documentation Research Team shall direct the TV/Photo Documentation Director relative to the post-test coverage of the CID AMK/crashworthiness experiments.

j. FAA Post-impact Investigation Experiment Team - FAA will conduct a typical accident investigation and analysis to assess the current National Transportation Safety Board (NTSB) accident forms, investigation procedures, documentation, and reporting; and usefullness of the flight data recorder/cockpit voice recorder for crashworthiness and human factor analysis. The team shall be cleared to enter the impact site by the Ground Operations Manager/Convoy Commander when safe to do so (I +3 HRS). Requests for documentation shall be made by the Investigator-In-Charge (IIC) to the CID TV/Photo Documentation Director.

k. Recovery of Tapes, Film and Experiments (TFER) Team -The photo and aircraft technicians of the TFE Recovery Team shall retrieve all film, tapes, video tapes, cameras, experiments, and other equipment required for the CID experiment evaluations under the direction of The CID Documentation Research Team. The team shall be cleared to enter the impact site by the Ground Operations Manager/Convoy Commander.

NOTE: Minimum disturbance or movement of experiments, equipment, parts, pieces, etc. within the impact site and aircraft MUST be adhered to during all phases of film, tapes, video tapes, cameras, and experiment retrevial.

NOTE: Additional documemtation of the removed experiments, ie. seats and interior locations, etc., will be accomodated prior to their shipment to respective facilities.

l. Site Security - The Security Police are tasked with two primary responsibilities in support of the CID program; (1) Provide protection of the CID impact site by limiting access to authorized personal only, and (2) provide traffic and crowd control within the CID termination envelope boundary/Hazardous Operations Control Area. Security of the impact site shall be 24 hours a day, beginning one week prior to the CID test until removal of the 720 carcass. (NASA contract security guards will be used for pre and post impact site security and access control) As this project will be conducted on USAF property and for safety and security measures, USAF Security Police will be posted at strategic points to form a protective cordon around the CID Hazardous Operations Control Area prior to (CID/720 Engine Start -1 HR) the CID/720 impact.

m. Flight Termination Corridor Ground Security - AFFTC Security Police and the AFFTC Control Tower shall be responsible for lakebed and termination corridor Air/Ground traffic control from start of flight operations thru CID/720 impact.

n. Contingency Operations Support - Within the capability of local area Contingency Response Force Teams, provide support to the CID/720 and CID Test Team in any emergency, contingency or catastrophic event resulting from termnation of the CID test in other than the planned impact site.

o. Recovery of DAS, Photographic Systems, Experimental Seats, Dummies, Transducers, and other Experimental Hardware. - The functional task of post-test dismantling and disposition of the CID test article and the removal, inspection, packaging, and shipping of the DAS, photographic systems, experimental seats, dummies, transducers, and other experimemtal hardware shall be covered by a separate plan.

p. <u>Impact Site Cleanup</u> - The USAF/AFFTC and FAA/NASA contractor support will clean the impact site and return it to it's agreed to configuration.

1.4 DEFINITIONS

a. Flight Operations - Starts at CID/720 engine start and ends at aircraft impact. Responsibility for the CID/720 operations changes from NASA 1 to the GOM/CC at aircraft impact. Although Flight Operations terminates at impact, A/DFRF control room support of post impact activities may be required. NASA 1 shall provide program support and coordination to the GOM/CC in support of the Ground Operations Test and Recovery Teams until mutualy agreed that support is no longer required.

b. Ground operations - All activities and ground support elements participating in pre-impact, impact, and post impact activity within the operational control area for CID operations.

c. Ground Operations Manager/Convoy Commamnder (GOM/CC) - Responsible for all personnel and the control of all parts of each element of the convoy while operating in the CID Hazardous Operations/Operational Control Area and CID/720 impact site as well as those personnel and equipment, not part of the convoy, which have need to operate within the CID Operational Control Area.
(FIG. TBD)

d. CID Operational Control Area - A specified area within which test related personnel and activities are under the control and direction of Ames Dryden Flight Operations. This area shall include all the area within the flight termination envelope boundaries prior to CID/720 impact and shall be an area including all aircraft debris as determimed by the CID ground operations manager/convoy Commander after CID/720 impact. (Fig. TBD)

e. CID Hazardous Operations Control Area - A defined area designed to safety criteria for specific hazardous conditions or operations. All personal and activities within this area are under the direct control and supervision of the Ames Dryden Flight Operations Test Director. (Fig. TBD)

f. Emergency Condition - A condition that requires immediate action be taken to prevent loss of life, injury, or destruction of equipment.

g. Contingency Operation - A departure from normal planned operations dictated by an abnormal event. Contingency Operations will be covered by preplanned approved procedures authorized for immediate implementation by Contingency Response Forces.

h. Contingency Response Force - The collective NASA/AFFTC/DOD resources available to bring to bear on any Contingency Operations problem.

i. <u>Post Impact Safing</u> - Consists of the integrated operations and activities that are necessary to reduce any normal or abnormal hazardous conditions of the CID/720, or the area surrounding the CID/720, to an acceptable, "as safe as possible", situation for the completion of the pre-planned post impact tasks. Safing of the test article shall include the delethalization of cabin atmosphere, checking for and removing fuel puddles, trapped fuel in the aircraft, ensuring that the aircraft and experiment batteries are turned off or disconnected, deflating all tires, if possible, and removing or discharging all high pressure bottles.

SECTION 2
GROUND OPERATIONS/CONVOY RESPONSIBILITIES AND ORGANIZATION

2.1 GROUND OPERATIONS/CONVOY RESPONSIBILITIES

The primary responsiblity of the CID/720 convoy is to provide operational control and support as required over all ground support elements participating in pre-impact, impact, and post impact activity within the operational control area for CID operations. Responsibility for the CID/720 operations changes from NASA 1 to the GOM/CC at aircraft impact. NASA 1 shall provide program support and coordination to the GOM/CC in support of the Ground Operations Test and Recovery Teams until mutualy agreed that support is no longer required. The convoy personnel/test teams must also provide on-site visual/verbal reports, and advise and consultation to the GOM/CC, CID control room, test team, top management, and the On-Scene Commander. In the event of emergency operations the ground operations manager/convoy commander (GOM/CC) will report directly to the Ames Dryden Chief, Research Aircraft Operations. The Contingency Response Force (CRF) will not normally respond unless requested by the GOM/CC through the AFFTC On-Scene Commander (OSC) except in cases of obvious disaster. The ground operations manager/convoy commander and the AFFTC On-Scene Commander work in concert to make final decisions as to implementation of the CRF.

The ground operations manager/convoy commander is also responsible for the control of all parts of each element of the convoy while operating in the CID/720 impact site as well as those personnel and equipment, not part of the convoy, which have need to operate within or at the perimeters of the CID Operational Control Area.

The AFFTC On-Scene Commander has full responsibility for all of the AFFTC/DOD resources which are either a part of the convoy or that may be called into the vicinity of the CID/720 during an emergency operation.

2.2 GROUND OPERATIONS/CONVOY ORGANIZATION

a. Ground Operations Manager/Convoy Commander (GOM/CC)
(Mr. Roger J. Barnicki)

b. AFFTC On-Scene Commander
(Maj. Michael Phillips, AFFTC Project Manager, 6510 TESTW/TEOB)

c. Fire Chief/Fire Department Pesonnel/Equipment
(TBD)

d. FAA Post-Impact Investigation Experiment Team
(Mr. Leo Garogz, Project Manager, ACT-330)
(Mr. Frank Del Geandio, Investigator-In-Charge (IIC), ASF-100)
(TBD)
(TBD)
(TBD)
(TBD)

e. TV/Photo Documentation Director
(Mr. John Gregoire, JPL)

f. TV/Photo Documentation Team
(TBD, Still Photographer)
(TBD, Motion Picture Photographer)
(TBD, TV/Video Camera Operater)

g. Tape,Film and Experiments Recovery Team
(TBD)
(TBD)
(TBD)
(TBD)

h. Security Police/Security Guards
(TBD)

i. Documentation Research Team
(TBD, FAA)
(TBD, NASA LaRC)

j. Aircraft/Experiment Safing Team
(TBD)
(TBD)
(TBD)
(TBD)

SECTION 3
PLAN OF OPERATIONS

3.1 PROCEDURE

Overall convoy preparation and operational control will be exercised by the GOM/CC by use of a convoy operations checklist (Appendix I) and this Ground Operations Plan.

All Post-Impact operations shall be per approved pre-planned instructions, ie. TV/Photo Plan, Post-Impact investigation Experiment Test Plan, etc., and the Post-Impact Site event and access time line checklist (3.3 Appendix II)

All USAF/DOD support provided to NASA and FAA to meet the requirements of the CID Program will be per existing AFFTC documents, reglations and this plan. Deviations from the requirements of these regulations will be made only as detailed herein, and as agreed upon by AFFTC, NASA, and FAA.

All personnel and vehicles of the CID convoy shall be in place 1/2 hour prior to CID/720 engine start. The main convoy will assemble on the lakebed at the fly-by tower/Santa Fe Trail area (Fig. ?). When assembled a verification of readiness shall be preformed by the GOM/CC per the convoy operations ckecklist (Appendix I) and a call to the NASA 1 control room Flight Controller shall made to verify that the convoy is ready to support the mission.

3.2 OPERATIONAL READINESS

When assembled a verification of readiness of the convoy and all supporting elements shall be preformed by the GOM/CC per the convoy operations ckecklist (Appendix I) and a call to the NASA 1 control room Flight Controller shall made to verify that the convoy is ready to support the mission.

3.3 IMPACT SITE ACCESS CONTROL

All entry to the CID Impact Site Operational Control Area shall coordinated and approved by the Ground Operations Manager (GOM).

Security control of the impact site shall be 24 hours a day, beginning one week prior to the CID test until removal of the 720 carcass. (NASA contract security guards will be used for pre and post impact site security and access control) As this project will be conducted on USAF property and for safety and security measures, USAF Security Police will be posted at strategic points to form a protective cordon around the CID Hazardous Operations Control Area prior to (CID/720 Engine Start -1 HR) the CID/720 impact.

Entry to the CID Impact Site prior to the interval controlled by security, personnel may enter the site (Fig. ?), by informing either Edwards Ground Control, by radio frequency 121.8, or Base Operations by telephone, 277-2222, upon entering and exiting the area. Entry during this period shall be from the Mercury Blvd. access point only. Use of the Santa Fe Trail by personnel shall be by the approval of the GOM or the Chief, Dryden Research Flight Operations.

Personnel entry to the CID Impact Site Controlled Area,beginning one week prior to the CID test until removal of the 720 carcass, shall be by CID IMPACT SITE PERSONNEL ENTRY BADGE <u>only</u>. Badges will be issued by NASA security office, ISF Lobby, when approved by the CID Ground Operations Manager (Mr. Roger Barnicki). Badges <u>will not be issued or kept at the impact site</u> and may <u>only</u> be optained as stated above.

Airfield Communications/Access - All vehicles on the lakebed shall maintain direct radio contact with the control tower or be escorted by a vehicle with a radio. All lakebed construction and test site operations must be coordinated with Edwards Airfield Management at 277-3808.

Other than as stated above <u>all vehicular or human access to, or habitation on, Rogers Lake, requires continuous radio contact with Edwards Ground Control.</u>

3.4 SECURITY

The Security Police are charged with two primary responsibilities in support of the CID program; (1) Provide protection of the CID impact site and the area within the CID termination envelope boundaries, by limiting access to authorized personal only, and (2) provide traffic and crowd control and protection of AFFTC property. (NASA contract security guards will be used for pre and post impact site security and access control)

For both of these functions the Commander, Security Police, will respond to the On-Scene Commander. The On-Scene Commander may delegete the crowd control portion of this responsibility to the Commander, Security Police, if the situation warrants it, i.e. excessive activity in the CID Operational Control Area as well as in crowd control.

Security of the impact site shall be 24 hours a day, begining one week prior to the CID test until removal of the 720 carcass. (NASA contract security guards will be used for pre and post impact site security and access control) As this project will be conducted on USAF property and for safety and security measures, USAF Security Police will be posted at strategic points to form a protective cordon around the CID Hazardous Operations Control Area prior to (CID/720 Engine Start -1 HR) the CID/720 impact.

A minimum of (TBD) roving and fixed patrols will be used to prevent unauthorized entry within the CID termination envelope boundaries and onto the lakebed or near operational areas to afford protection of personnel and property.

On-base and off-base operations of the security police will be conducted per existing EAFB regulations.

In the event of a crash impact, other than a controlled impact at the planned site, security police will respond as directed by the On-Scene Commander. If the impact occurs off base, the On-Scene Commander is responsible for coordinating with civil authorities and will deploy security police to the scene as required. On the confines of EAFB. Security Police will afford full security protection of the Impact Site. Off the confines of EAFB, Security Police will assist NASA as requested and as consistent with agreements and regulations pertaining to civil law enforcement authorities. A cordon around the impact/crash will be established by the Security Forces under the direction of the On-Scene Commander a minimum of 2000 feet from crashed CID/720. Entry to the cordoned area will be authorized only by the On-Scene Commander, or the NASA on-scene representive (GOM/CC).

Traffic and personnel will be controlled and prohibited from using Rocket Site Road and Mercury Blvd. from Highway 58 to 120th Street East thirty (30) minutes prior to the start of "Flight Operations" till cleared for normal vehicle and personnel use by the GOM/CC or On-Scene Commander.

Official Observers, VIPs, Guests, and Media personnel will be directed to either the Offical Guest area, the Distinguished Guest area, or the Media areas as designated by NASA Ames Dryden Management. NASA will assist in traffic control at these areas.

3.5 FIRE DEPARTMENT

Fire/Rescue personnel and firefighting apparatus will be prepositioned at designated locations on the base and with the convoy outside the flight termination envelope boundaries. Prior to CID/720 impact, the Chief, Fire Protection Branch, will respond to the On-Scene Commander and support him as required. Once this team is activated by the On-Scene Commander, a senior fire officer directs this team in crew rescue and fire suppression as required in accordance with AFFTC and USAF procedures and the CID program requirements. All personnel on this team, including the senior fire officer, will receive CID/720 Program peculiar fire, crash, and rescue training from FAA and ADFRF

After fire suppression actions are complete, the fire chief will again respond to the On-Scene Commander, as required.

Major fire fighting capability will be provided by either standard USAF P-2 or P-4 vehicles. Capability includes water and foam. Normal crew is two or three firefighters. Three minute response time allows coverage up to about one mile radius in any direction, terrain permitting.

The senior on-scene fire officer shall report, to the On-Scene Commander, when the CID/720 and impact site is declared safe for entry by the AES, ISD, DRT, IET, and TFER teams. (Entry of any personnel into the impact site after impact shall only be granted by the Ground Operations Manager/Convoy Commander)

3.6 ENGINEERING PHOTO/TV COVERAGE

Ground photo and TV support will be part of the CID Ground Operations. The photo and TV coverage will be utilized for Engineering and PAO purposes with Engineering purposes taking precedent. Engineering TV and photo coverage will be under the operational control and direction of the GOM/CC, implemented through the CID TV/Photo Documentation Director/Coordinator. The CID TV/Photo Documentation Director/Coordinator will be located in the (TBD) vehicle, which well be part of and accompany the convoy. The movement of all TV/photo personnel and equipment within the Operational Control Area will be under the control of the GOM/CC.

3.7 PAO MEDIA/PHOTO/TV COVERAGE

TV/Photo News Media coverage will be from an approved ADFRF Public Affairs News Media Site (Shuttle Media Site 4) located on the edge of Rogers Dry Lakebed, outside the flight termination envelope boundaries. Access to the media site will be by approved CID News Media credentials and vehicle pass, using normal surface roads. All Media using RF generating equipment shall have their equipment checked and approved by the NASA frequency control officer prior to use on the Edwards Air Force Base complex.

SECTION 4
COMMUNICATIONS

4.1 GROUND OPERATIONS MANAGER/CONVOY COMMANDER (GOM/CC) COMMUNICATIONS

The communications used for the CID Ground Operations will consist of RF communications only as shown on Figures ? and ?.

The Convoy Command net will be used for overall convoy management purposes, Impact Site access control, and for contingency operations if necessary, as well as for coordination and convoy funtional status.

4.2 SECURITY COMMUNICATIONS

Communications between the AFFTC On-Scene Commander, the Security Commander, and his forces are shown in Figure ?.

4.3 ENGINEERING PHOTO/TV COMMUNICATIONS

Communications between the GOM/CC, the TV/Photo Documentation Director, and his support teams will be provided by hand held VHF (brick) sets as shown in Figure ?.

4.4 FIRE DEPARTMENT COMMUNICATIONS

Communications between the AFFTC On-Scene Commander, the Fire Chief, and his forces are shown in Figure ?.

4.5 AIR/GROUND COMMUNICATIONS

Air/Ground Traffic Control - The chief of Air Traffic Control Operations at Edwards AFB will ensure the safe conduct of air/ground traffic during the CID/720 test.

4.6 OTHER COMMUNICATIONS

(TBD)

SECTION 5
TRAINING

5.1 TRAINING APPROACH AND SIMULATIONS - (NONE IDENTIFIED AT THIS TIME)
5.2

SECTION 6
CONTINGENCY/EMERGENCY OPERATIONS

6.1 GENERAL

For this plan a contingency or emergency operation will be considered to have the same meaning. Due to the hazards that are associated with the CID/720 impact/flight program, any abnormal conditions, whether minor or major, will be handled according to planned approved actions when possible to avoid injury/damage the personnel or equipment. All safing operations of CID/720 will be performed in accordance with the highest degree of hazard existing during the performance of the operation.

6.2 RESPONSIBILITIES

The Ground Operations Manager/Convoy Commander (GOM/CC) is the Contingency Operations Director (NASA On-Scene Represenitive) for mishaps within the CID Operational Control Area and reports to the Dryden Operations Flight Controller, or his representative in the ADFRF CID control room. For a mishap outside the CID Operational Control Area, the GOM/CC will board a DOD/AFFTC helicopter and will serve as Air Contingency Operations Director (NASA On-Scene Representative) reporting to the Chief, Dryden Research Aircraft Operations. Responsibility for the CID/720 operations changes from NASA 1 to the GOM/CC at aircraft impact. NASA 1 shall provide program support and coordination to the GOM/CC in support of the Ground Operations Test and Recovery Teams until mutuality agreed that support is no longer required.

LIST OF DOCUMENTATION THAT IS PART OF THIS PLAN BY REFERENCE

- AFFTC Statement of Capability, Controlled Impact Demo, 28 Nov. 1983, SC NO F-84-11-14, AFFTC Job Order Number (JON): 921ENO
- AFFTC/NASA CID Security Plan
- AFFTC Regulation 55-1, Requirements for personnel and vehicles operating on the AFFTC flight line or lakebed
- FAA/NASA Public Affairs Plan
- CID Post-Impact Investigation Experiment Test Plan, 18 June 1984
- Photographic/Video Coverage Plan, March 1984
- Recovery of DAS, Photographic Systems, Experimental Seats, Dummies, Transducers, and other Experimental Hardware Plan.

LIST OF ABBREVIATIONS AND ACRONYMS

The following abbreviations and acronyms are used in this document.

ADFRF	Ames Dryden Flight Research Facility
AES	Aircraft/Experiments Safing
AFFTC	Air Force Flight Test Center
A/G	Air to Ground
CC	Convoy Commander
CRF	Contingency Response Force
DAS	
DFRF	Dryden Flight Research Facility
DOD	Department of Defense
DRT	Documentation Research Team
EAFB	Edwards Air Force Base
FAA	Federal Aviation Adminstration
GE	General Electric
GOM	Ground Operations Manager
GSE	Ground Support Equipment
I	Impact
IET	Investigation Experiment Team
IIC	Investigator-In-Charge
ISD	Impact Site Documentation
JON	Job Order Number
JPL	Jet Propulsion Laboratory
LaRC	Langley Research Center
NASA	National Aeronautics and Space Administration
NTSB	National Transportation Safety Board
OSC	On-Scene Commander
PAO	Public Affairs Office
PM	Program Manager
RF	Radio Frequency
SP	Security Police

T	Take-Off
TBD	To Be Determined
TCI	
TFER	Tape, Film, and Experiments Recovery Team
TV	Television
UHF	Ultrahigh Frequency
USAF	United States Air Force
VHF	Very High Frequency
VIP	Very Important Person

APPENDIX I

MEMORANDUM FOR THE RECORD
FROM: OP/CID Project Manager
SUBJECT: Access to the Controlled Impact Demonstration (CID) IMPACT Site
January 20, 1984

National Aeronautics and
Space Administration

Ames Research Center
Dryden Flight Research Facility
P.O. Box 273
Edwards, California 93523

NASA

OP January 20, 1984

MEMORANDUM FOR THE RECORD

TO: All Concerned

FROM: OP/CID Project Manager

SUBJECT: Access to the Controlled Impact Demonstration (CID) Crash Site

The CID project has coordinated with the USAF/AFFTC in an attempt to minimize the procedural difficulties associated with accessing the CID crash site which is located on Rogers Lake.

Normally, any vehicular or human access to, or habitation on, Rogers Lake, requires continuous radio contact with Edwards Ground Control.

The AFFTC Airfield Manger, (T. K. Gwin), has established that personnel can habitate the CID area, (shaded in on the attached maps), without maintaining radio contact with Edwards Ground Control. Personnel will be required to inform either Edwards Ground Control, by radio frequency 121.8, or Base Operations by telephone, 277-2222, upon entering and exiting the area.

Access to the CID area is most easily accomplished via the dirt road which intersects Mercury Blvd as shown on the map. Personnel familiar with the lakebed and normal Edwards procedures, can enter and exit the area via the Santa Fe Trail, using the conventional clearances from Edwards Ground Control. However, use of the Santa Fe Trail route should be kept to a minimum.

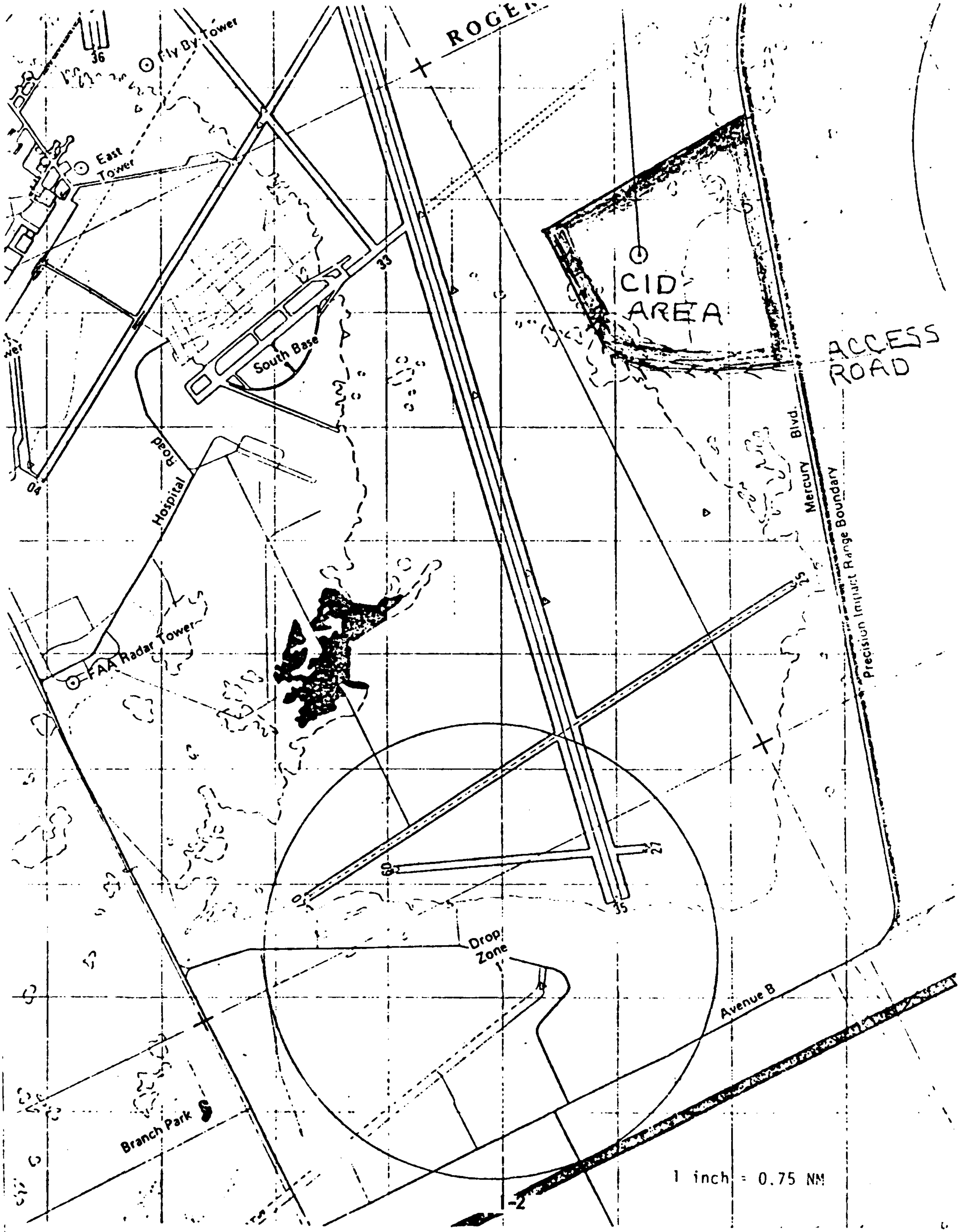
It should be noted that the northern boundary of the CID Area is a line intersecting the most northerly islands of the CID cove. Access beyond that boundary will require continuous radio contact with Edwards Ground Control.

M. R. Barber

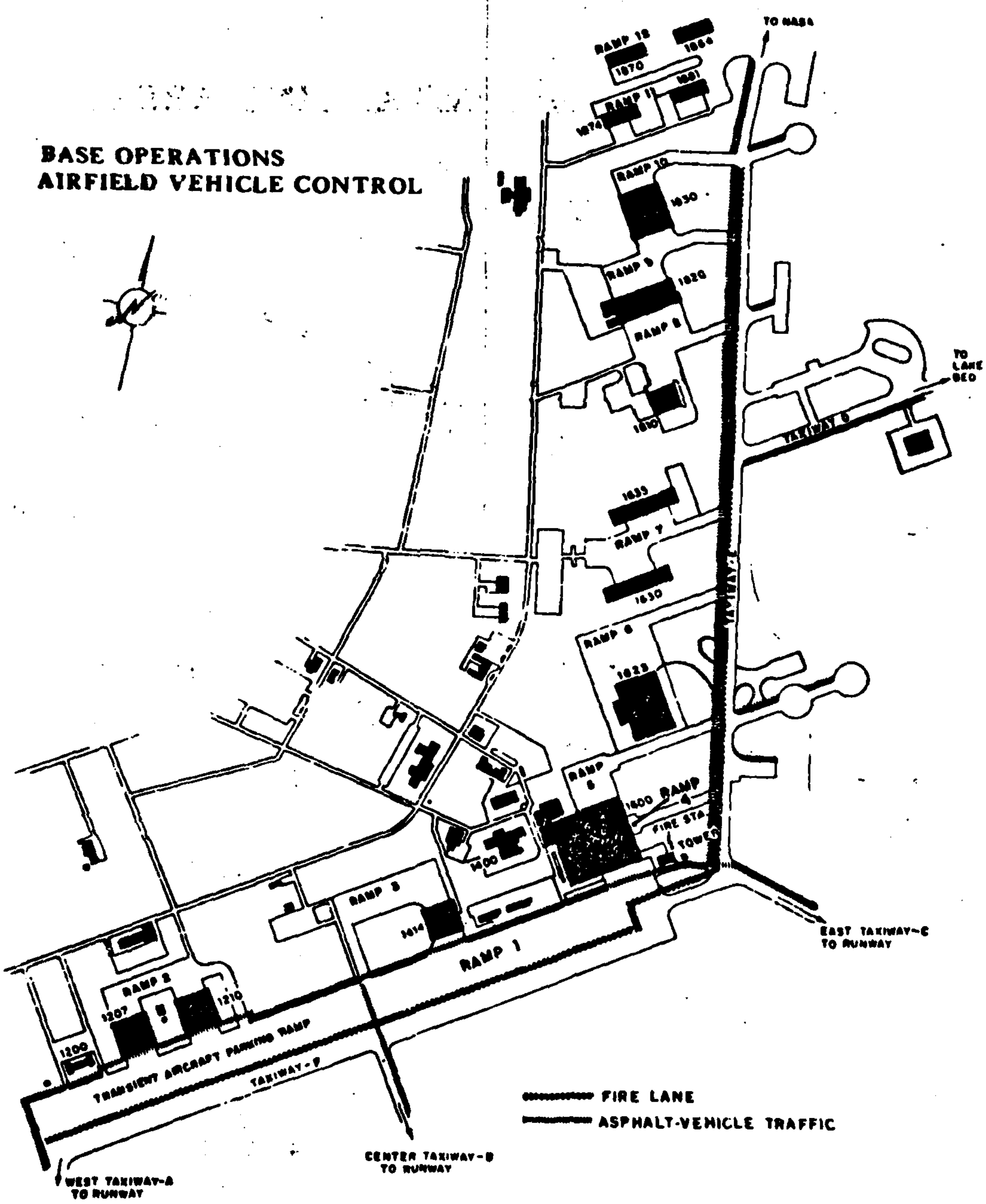
M. R. Barber

Enclosure

Concur ______________________
T. K. Gwin
AFFTC Airfield Manager


ROGER
Fly By Tower
36
East Tower
33
South Base
04
Hospital Road
FAA Radar Tower
CID AREA
ACCESS ROAD
Mercury Blvd.
Precision Impact Range Boundary
25
09
21
35
Drop Zone
Avenue B
Branch Park
1 inch = 0.75 NM
1-2

AFFTC REGULATION 55-1

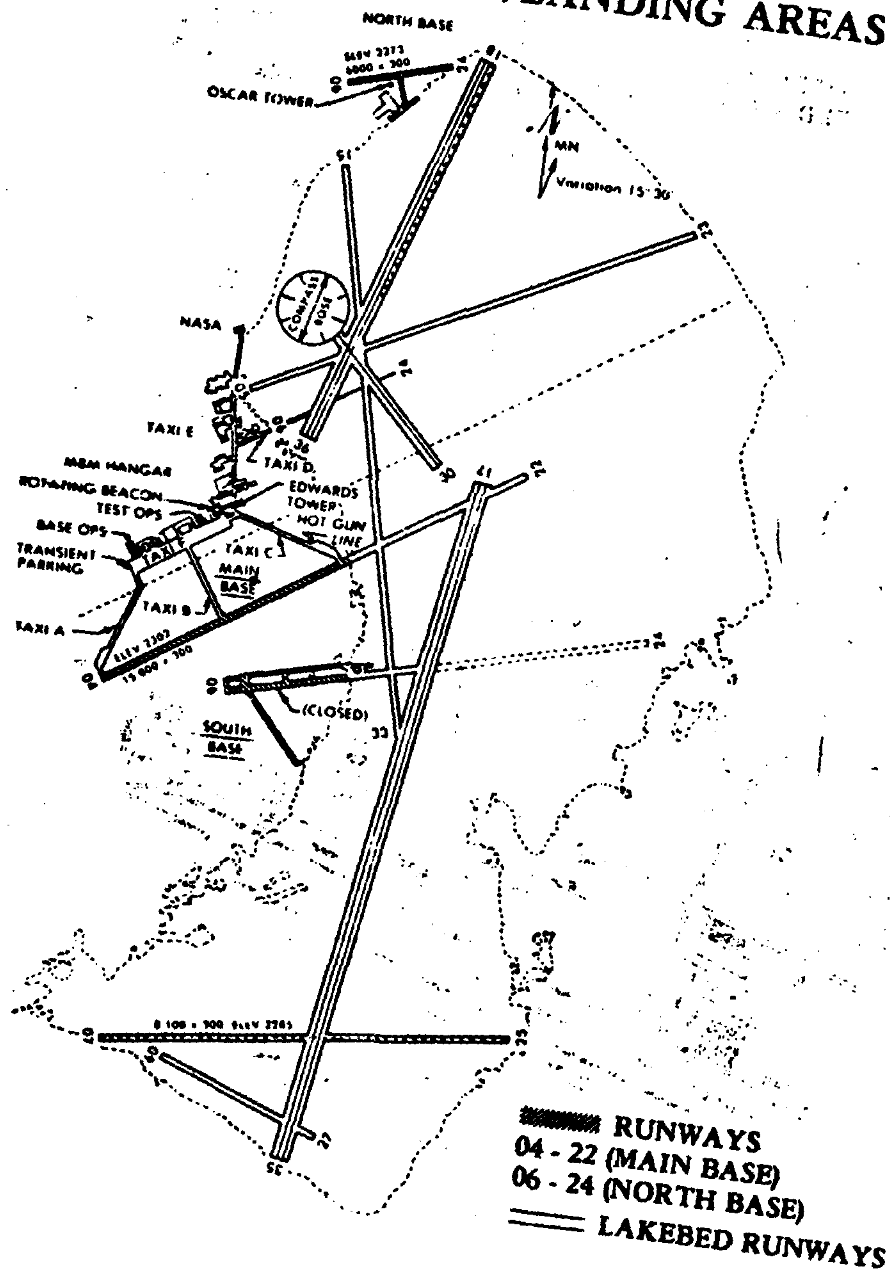


Attachment 1

AFFTC REGULATION 55-1

RUNWAY COMPLEX/LANDING AREAS

(NOT TO SCALE)



Attachment 2

APPENDIX J

FLIGHTLINE VEHICLE TRAFFIC

FLIGHTLINE VEHICLE TRAFFIC

1. Motor vehicles operating on the flightline are necessary to normal operations and maintenance. However they present a potential danger, both to aircraft and to ground personnel. Carelessness, haste, and disregard of existing safety standards by flightline vehicle operators is inexcusable and is the primary source of aircraft-vehicle collisions and personal injury.

a. Terms (AFFTCR 55-1):

(1) Airfield. The area encompassing the flightline, taxiways, accesses, runway, and the entire area of Rogers and Rosamond dry lakebeds.

(2) Flightline. For the purposes of entry control, the flightline is defined as the area within the security fences.

(3) Runway Areas. An area extending 300 feet from all sides of the hard-surfaced runways and all lakebed areas located on Edwards AFB.

(4) Authorized Vehicle Lanes. Areas and lanes, outlined in yellow, designated and approved for motor vehicle traffic.

(5) Contractor Vehicles. Vehicles owned or leased by a contractor engaged in an approved project at Edwards AFB.

(6) Radio-Equipped Vehicles. Any vehicle with a two-way radio channelized to the tower (120.7, 121.8, 390.1, 318.1), Ramp Net 148.1, or the Fire Crash Net 173.5875.

b. Authorization:

(1) Only operators and vehicles designated by the base operations officer (6510TESTW/OTMO), as prescribed in AFM 77-310 and AFM 77-2, and implemented locally by AFFTCR 55-1, will be given access to the flightline. These operators, before driving on the flightline, will be provided with special instructions and tested to assure that they are advised of the particular hazards involved. Certification of this training and testing will be entered on the individual's record (DD Form 1360) and the SF 46 will be overstamped if a government-owned vehicle is to be driven. Those persons driving privately-owned/contractor-owned vehicles will be provided an AFFTC Form 490 (Flightline Training Certificate). No other persons will be allowed to operate vehicles on the flightline except for specified short periods, and only by temporary written permission and instruction by the base operations officer as prescribed in AFM 55-48 and AFFTCR 55-1.

(2) Personnel driving on the flightline will be kept to a minimum, consistent with operational requirements.

(3) The base operations officer periodically reviews these instructional materials to insure that it is current.

(4) Vehicle operators on OJT for flightline duties will not operate a vehicle within 50 feet of an aircraft. This restriction does not apply to firefighting vehicles/equipment, OJT operators towing aircraft, loading/unloading MHE, and aircraft servicing vehicles. In all cases, drivers on OJT must be qualified to operate the vehicle and be accompanied by a qualified trainer.

c. Operating Standards: The following standards will be observed at all times when operating a vehicle on the flightline. Careful attention and strict adherence to these precautions will prevent the accidental damage to aircraft and possible injury to both flight and ground personnel. Bicycles operated on the flightline will conform to these flightline vehicle standards.

(1) Parked Aircraft. Vehicles will not be driven within 10 feet of an aircraft, except when the aircraft is being serviced, loaded, off-loaded, and in these cases, only when spotters are placed to guide the approach to the aircraft. Vehicles never should be driven under any part of the aircraft. Vehicles also will not be backed or driven forward in the immediate direction of any aircraft except as authorized in certain loading, unloading, or fueling operations. In these cases, prepositioning of wheel chocks is required to prevent striking the aircraft. Guides will always be posted as a safety measure. Chocks will remain in position until vehicles leave from within the 10-foot safety distance requirement. When parked on the flightline, vehicles will not be pointed directly toward the aircraft. All powered vehicles and all equipment mounted on wheels, which do not have integral braking systems, will be chocked when left unattended on the flightline. Vehicles will be left unlocked with the keys in the ignition when parked in the immediate vicinity of an aircraft.

(2) Passengers. Passengers in or on Government vehicles will display particular caution. They will remain seated while the vehicle is in motion and keep their arms and legs within the body of the vehicle. Passengers will not ride on tug fenders unless a suitable seat with back and side guards, is installed, nor will they ride on any part of moving equipment not designated especially for passengers. Passenger-carrying vehicles will only stop at the side of aircraft when actually loading or unloading passengers.

(3) Taxiing Aircraft. Under no circumstances will vehicles stand in front of, or drive into, the path of taxiing aircraft except "GUIDE" or "FOLLOW ME" vehicles, nor will other vehicles drive between the aircraft and its "GUIDE" vehicle.

(4) Aircraft Engine Runup. For maximum safety, no vehicle will be parked or driven closer than 25 feet in front of or 200 feet to the rear of any aircraft with engines in operation or about to be put into operation. Vehicles parked at the side of the aircraft will be located clear of the wingtips and be clearly visible to the aircraft cockpit personnel.

(5) Crossing Active Runways. Vehicle operators will not enter any active runway without first receiving tower clearance via UHF/VHF radio. During hours that the airfield is closed (normally 2200-0600 daily) this clearance must be obtained from the Command Post via UHF/VHF radio. Edwards flightline has a centralized crossing point for all vehicles, except munitions vehicles that are carrying live ordnance, for required crossing at runway 04/22. This crossing point is located at the junction of center taxiway (Taxiway B) and runway 04/22. Runway crossings are restricted to those vehicles authorized by the Test Wing Commander or in special cases by the Chief, Base Operations. The operator of any vehicle that has become disabled on the runway or lakebed will notify the tower or command post immediately. All available emergency flashers will be actuated on the disabled vehicle.

(6) Crossing Taxiways. Vehicles will only cross taxiways at marked crossing points. All flightline vehicles will come to a full stop before they enter or cross a taxiway. Before proceeding, the operator will determine visually that the way is clear. AIRCRAFT ALWAYS HAVE THE RIGHT OF WAY!

(7) Speed Limits. Except in unusual cases, general purpose vehicles will never operate at speeds greater han 15 miles per hour while on the flightline; special purpose vehicles will not exceed 10 miles per hour; no vehicle will operate in excess of 5 miles per hour when in close proximity to parked aircraft. Aircraft will not be towed more than 5 miles per hour at any time. During emergencies, fire and crash equipment and ambulances may exceed speed limits with prudence and with due regard for personnel safety. The speed limit on taxiways A, B, C, D, & E is a maximum of 30 miles per hour. The speed limit on Rogers, Buckhorn, and Rosamond dry lakes is 50 miles per hour.

(8) Wheeled Equipment. Compressors, auxilliary power units, and similar equipment will not be towed by general purpose vehicles unless properly equipped with hitches designed for the purpose. Tugs or other vehicles with suitable trailer hitches will normally be used, and equipment will never be towed faster than 15 miles per hour. Safety chains will not be required on AGE equipment. Pintle hook safety pins will be used in all flightline towing operations. Vehicles and wheeled equipment that do not have integral braking systems, when parked within 25 feet of any aircraft, will have one rear wheel chocked fore and aft. Any vehicle parked on the flightline will have the transmission placed in reverse; or in "park" if equipped with an automatic transmission.

(9) Vehicle Lights. Headlights shining toward a moving aircraft at night will be turned off immediately so the pilot will not be blinded or his night vision affected. The vehicle's parking lights will be turned on, so its position will be known, but the headlights will remain out until the aircraft is out of range. All motor vehicles will use emergency warning flashers (directional signals front and rear) when parked on the flightline during hours of darkness or inclement weather.

(10) Foreign Object Damage (FOD) Prevention. Vehicles on the flightline are a major source of foreign objects that can damage aircraft tires and can be ingested into jet engines. Before airfield operations, operators will insure that all equipment carried on their vehicles is properly stowed and secured and that the vehicles are inspected for objects that could damage aircraft. When dual-wheeled vehicles are operated on unpaved surfaces, they will frequently pick up rocks between the tires. Operators will stop when reaching the airfield pavement and remove any rocks that are wedged between the tires or treads. Vehicle operators are responsible for stopping and picking up any foreign objects that are observed while driving on the flightline. Failure to do so could result in their SF 46 being revoked.

(11) Operating Near Navigation Facility Transmitters. Serious mishap potential exists when vehicles are operated in the path of radio beams used for aircraft navigation. Flightline vehicle operators will be instructed concerning the location and necessary precautions to be taken when operating near such equipment.

(12) Control Tower Signals. There is no Control Tower Light System at the AFFTC. Flightline vehicles are under the direct, radio control of the control tower personnel. Their radio instructions will always be adhered to by all vehicle operators. Standard radio procedure will be observed at all times. To alleviate misunderstandings, phonetic equivalents will be used when referring to lettered taxiways, ramps, etc.

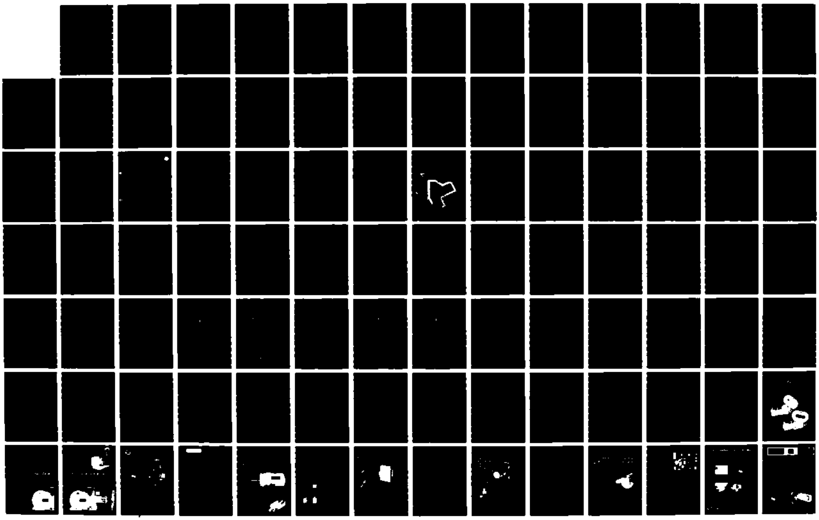
d. Marking of Vehicle Traffic and Fire Lanes. Only authorized markings are applied to permanent flightline surfaces. These markings include boundary lines, nose wheel guide lines on aprons and taxiways, and other markings necessary for the safe movement of aircraft and vehicular traffic. All general purpose vehicles are required to stay within designated traffic lanes at all times. Only bonafide emergency vehicles responding to an emergency are exempt from this requirement. EMERGENCY VEHICLES are those vehicles equipped with an emergency lighting system. Special purpose vehicles such as tugs, follow me, trucks, refueling equipment, etc., may leave the designated roadways as necessary. However, their operations are limited to traveling from the designated roadway, adjacent to an aircraft, to the aircraft directly and then directly back to the roadway. UNDER NO CIRCUMSTANCE WILL SPECIAL PURPOSE VEHICLES, MAINTENANCE VEHICLES, GENERAL PURPOSE VEHICLES OR OTHER VEHICLES TRAVEL OFF THE DESIGNATED ROADWAYS UNLESS ESCORTED BY AIRFIELD MANAGEMENT. EMERGENCY VEHICLES RESPONDING TO AN EMERGENCY ARE EXEMPT FROM THIS REQUIREMENT. Additional information is in AFR 91-17.

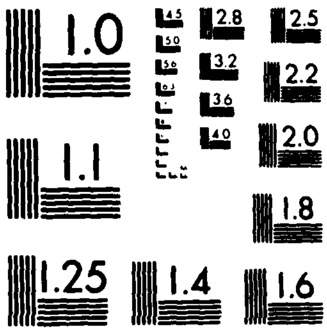
e. Vehicle Parking Passes. Individuals holding parking passes for the flightline area, for their POVs or Contractor vehicles are under certain restrictions. They may enter the flightline area only through the gate closest to their designated parking area. They must proceed directly to and from their designated parking area. Any vehicle found in an unauthorized area is subject to having its parking pass revoked immediately. Any vehicle parking pass that is revoked may not be reissued. Specific procedures for issuing and controlling parking passes are contained in AFFTCR 55-1.

APPENDIX K

16MM DOCUMENTARY COVERAGE

AD-A171 719 FULL-SCALE TRANSPORT CONTROLLED IMPACT DEMONSTRATION 3/5
PROGRAM PHOTOGRAPHIC..(U) JET PROPULSION LAB PASADENA
CA J D GREGOIRE APR 86 JPL-D-2534 DOT/FAA/CT-85/35
UNCLASSIFIED DTFA03-80-A-00215 F/G 14/5 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963 A

16MM DOCUMENTARY COVERAGE

TUESDAY NOV. 27:	COVER SET-UP OF REMOTE AND MOUNT CAMERAS AT CID SITE. CONCENTRATE ON THE WORK BEING DONE BY THE VANDENBERG AND DAHLGREN CONTRACTORS.
WEDNESDAY NOV. 28	COVER ON-BOARD CAMERAS (LANGLEY). COVER JPL TAIL, NOSE, AND COCKPIT CAMERA INSTALLATION AND SET-UP. COMPLETE SET-UP OF HARD LINE REDUNDANT CAMERAS.
THURSDAY NOV. 29:	START COVERAGE OF FINAL PREPARATION.
FRIDAY NOV. 30:	START COVERAGE OF FINAL PREPARATION OF 720 AIRCRAFT FOR TEST. FUEL MIXING EQUIPMENT AND OPERATION ARE OF MAJOR CONCERN. INCLUDE FAA AND JPL TECHNICIANS AT WORK.
SATURDAY DEC. 1. 0300 TO 0900	CAMERAMAN JOINS THE NASA 25 VAN AND FOLLOWS IT TO THE TAKE OFF SITE EARLY ON SATURDAY MORNING. HE WILL DOCUMENT THE FINAL HOURS AND MINUTES OF THE PLANE'S PREPARATION, UP UNTIL THE BRAKE IS RELEASED AND IT ROLLS TO ITS PILOTLESS TAKE-OFF. HE THEN MOVES TO HIS POSITION AT 17/22 TO RECORD THE ACTION SURROUNDING THE PHOTO MOUNT AND NASA 25 AT THE TIME OF THE CRASH.
0915	AFTER THE CRASH HE WILL RECORD THE FILM AND VIDEO TAPE DISPERSAL FROM THE MANNED CINE SEXTANT, THEN CROSS TO THE CID SITE TO COVER THE ON-GOING ACTION.
1130	AS THE MORNING GOES ON HE WILL RECORD THE VIP INSPECTION OF THE SITE AND THE GENERAL POST-CRASH ACTIVITY.
1130-1230	LATER HE WILL FILM THE PRESS BRIEFING AT NASA AND THE JPL VIDEO DUPING SET-UP.
1300	STAND BY
1500	END OF DAY
1700	FILM POST-CRASH SUCCESS PARTY

APPENDIX L

ENGINEERING PHASE/TV COMMUNICATIONS

ENGINEERING PHASE/TV COMMUNICATIONS

Communication between the Ground Operations managers, the Photo/TV Documentation Director, and his support team were provided by hand held VHF units (bricks); see attached list of users.

FIRE FIGHTING PHOTOGRAPHERS:

Communications between the Photo/TV Director the AFFTC on-scene commander, the Fire Chief and his forces are shown in Fig. ___ attachment Firefighting Photographers.

Designated Frequencies:

Convoy Net (Ch2)	Transmit	409.900
	Receive	417.250
Photo/TV (Ch3)	Transmit	409.350
	Receive	415.925
Gr. Ops and Photo/TV	Transmit	410.300
Back Op - See (CH1)	Receive	416.350
Photo Operations		139.0
Tracking		140.025
Comm		140.9
IRIG/Turn on		140.475

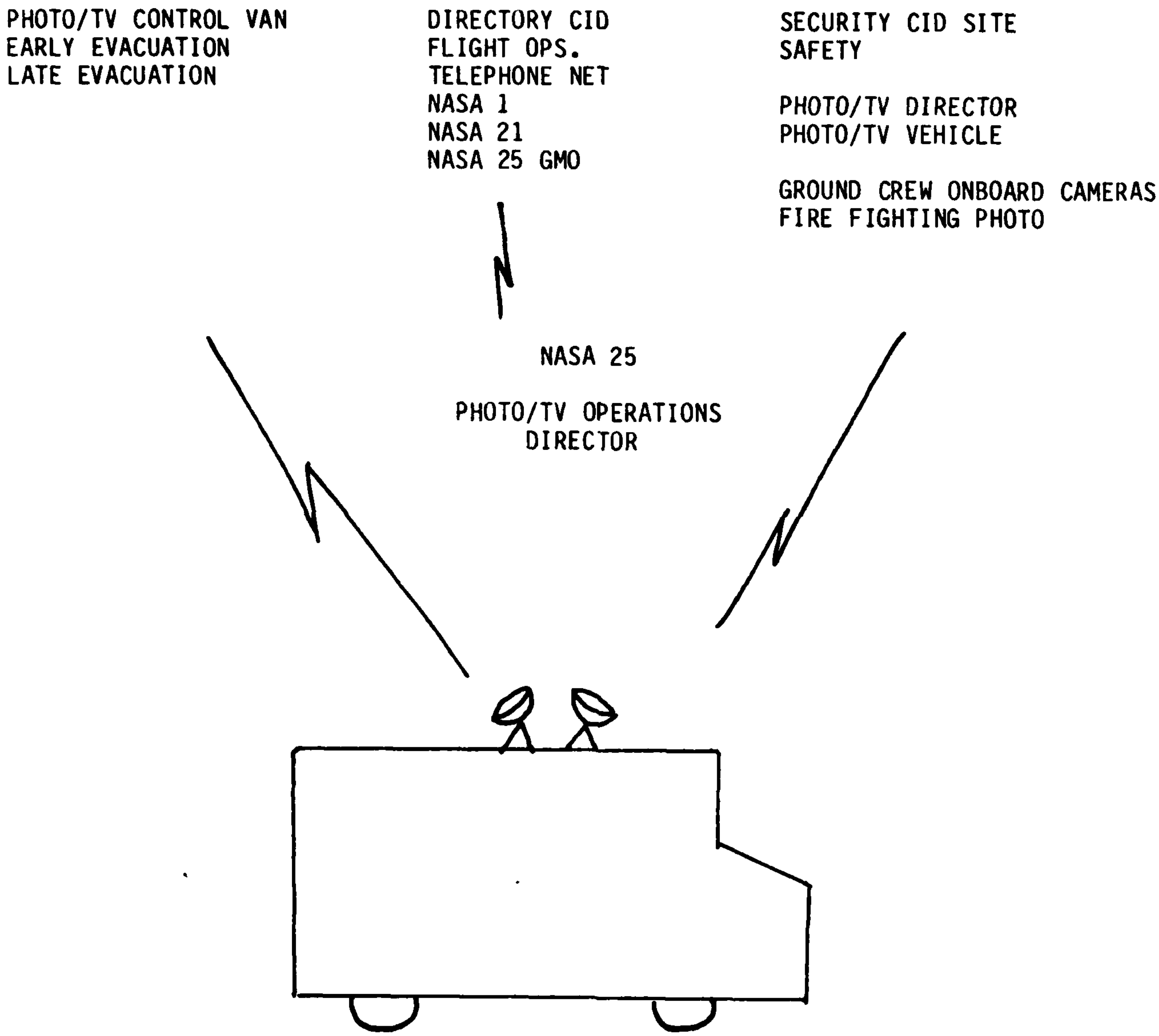
Permission was needed from the Dryden Frequency Range Offocer each day the army had first call for the frequencies. On most days it was not available to the CID Photo Test Team. The army granted CID Photo usage after normal work hours, resulting in countless overtime hours. The army did not use the frequencies on CID day, (Saturday).

Direct Frequencies users:

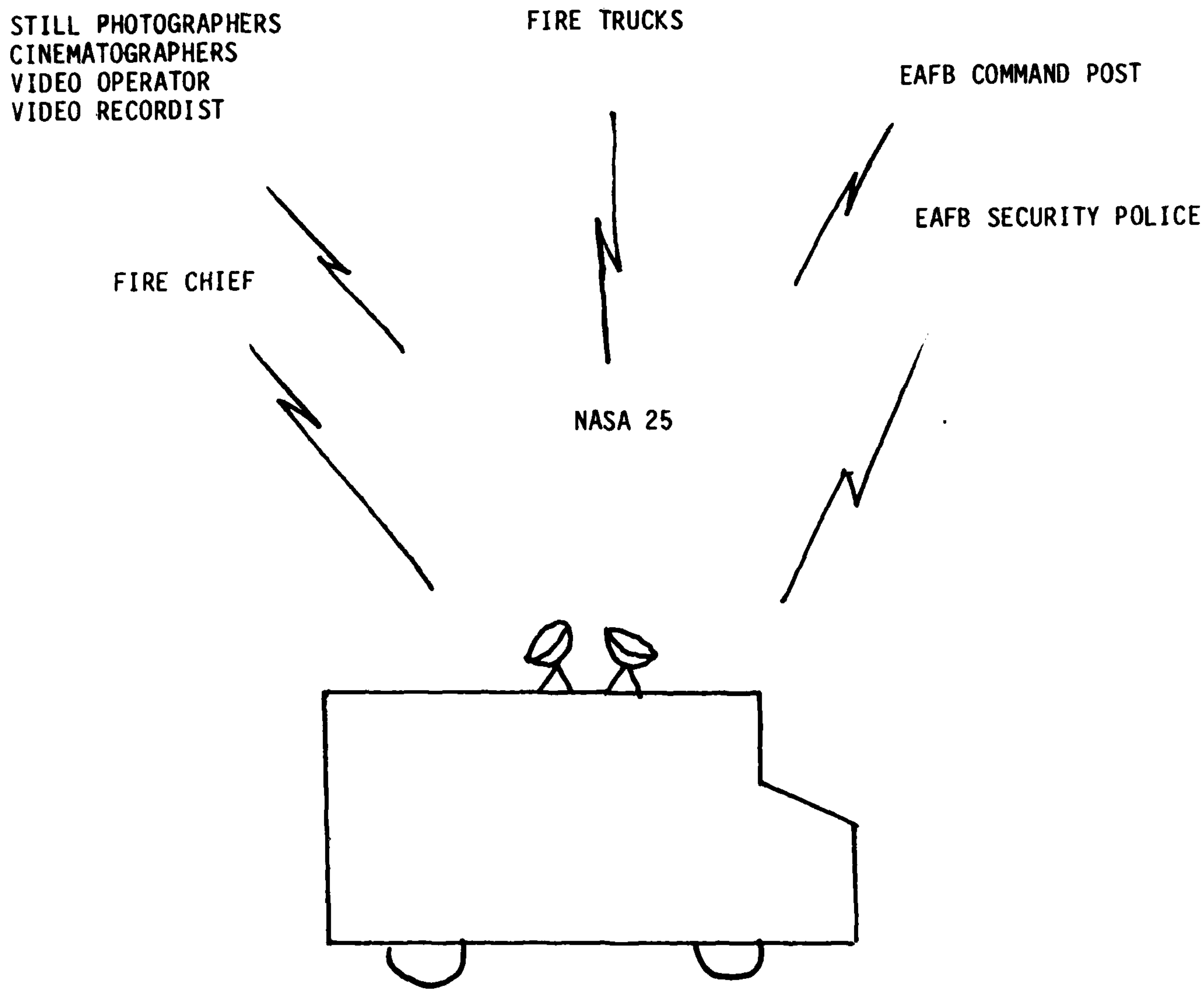
Microwave - Video Tracking

AM	Cameras on/off
IM	IRIG Range Timing
FM	Hand-held wire radio
FM	Photo/TV Operations
UHF	Base operations NASA 1
VHG	Base operations NASA 25
VHF	BAse operations, Air Force control
UHF	Vehicle access to flight line

PHOTO/TV OPERATIONS COMMUNICATIONS



FIREFIGHTING PHOTOGRAPHERS
COMMUNICATIONS



NASA GOM	BARNICKI - WHEN OUT OF NASA 25 (HANDHELD-DES)
NASA SECURITY 01	POST 1 AT DRYDEN (HANDHELD)
NASA 01	DRYDEN FLIGHT CONTROL CENTER
NASA 04	PILOTS OFFICE - FLIGHT OPERATIONS
NASA 07	CID CREW CHIEF - UHF RADIO
NASA 10	A/C SUPPORT - UHF RADIO
NASA 15	NASA TM VAN - ROOK-SABO - UHF RADIO
NASA 22	EDGEWORTH - UHF RADIO
NASA 24	ANDERSON - UHF RADIO
NASA 25	CID COMMAND POST (FLT OPS COMM VAN)
NASA 27	COHN - UHF RADIO
NASA 28	NASA TV VAN QUINTRON - UHF RADIO OR HANDHELD
NASA 53	CID SHUTTLE BUS - UHF RADIO
GR OPS 01	ALLEN (DEP GOM)
GR OPS 15	NASA TM VAN - ROOK-SABO (HANDHELD RADIO)
GR OPS 02	MISPLAY (720 GR CREW CHIEF)
GR OPS 03	TOWNSEND
GR OPS 05	SAWYER
GR OPS 06	KINN
GR OPS 07	SAHAI
GR OPS 08	LOREK
GR OPS 09	JAMESON
GR OPS 10	GONZALES
GR OPS 11	WEBBER
GR OPS 12	FEDOR
GR OPS 22	EDGEWORTH (HANDHELD RADIO)
GR OPS 24	ANDERSON - OPS ENGINEERING (HANDHELD RADIO)

GR OPS 27	COHN - SCOTT PACKS/BREATHING AIR (HANDHELD)
PHOTO 01	TV/PHOTO DOC. DIRECTOR (GREGOIRE)
PHOTO 02	SHIPMAN (ON LAKEBED)
PHOTO 03	WYNNE (ON LAKEBED)
PHOTO 04	DAWSON (ON LAKEBED)
PHOTO 05	TIBBITS (ON LAKEBED)
PHOTO 06	TRIMM (ON LAKEBED)
PHOTO 07	SZCZUROSKI (ON LAKEBED)
PHOTO 08	FRANZ (ON LAKEBED)
PHOTO 09	MC BANE (ON LAKEBED)
PHOTO 10	BRIDGES (ON LAKEBED)
PHOTO 11	NAGGY
PHOTO 12	HORNADAY
CHARLIE 36	CID SITE SECURITY POST
CHARLIE 37	CID SITE SECURITY
CHARLIE 38	CID/720 SECURITY
CHARLIE 39	PHOTO EQUIP/MEDIA SITE SECURITY
CHIPPY	FACILITIES/SER-AIR SUPPORT COORDINATOR
DRIVER 25	CULLUM
DRYDEN COMM	QUINTRON (NASA 1)
EDDIE LEADER	LT COL SAXER
EDWARDS CHIEF	AFFTC FIRE CHIEF
EDWARDS SECURITY	EDMONSON (AIR POLICE)
GE	MORGAN - GENERAL ELECTRIC ENG
LANGLEY 01	DAS TEAM
LIFE SUPPORT	LIFE SUPPORT SHOP (CH 2 ONLY)(DES)

PAO 01	LOVATO (MEDIA)
PAO 02	REINERTSON (MEDIA)
QUALITY	FUENTES
SAFE LEADER	DEL GANDIO (FAA SAFEING TEAM LEADER)
SERV-AIR 01	SERV-AIR SUPPORT SUPERVISOR
SERV-AIR 02	SERV-AIR CREW LEADER
SITE MANAGER	KNUTSON (HANDHELD-DES)
TV 01	TBD (ON LAKEBED)
TV 02	TBD (ON LAKEBED)
TV 03	WHEATON(DRYDEN)

APPENDIX M

C.I.D. DAY
PHOTO OPERATIONS CHECK LIST

and

CID FLIGHT CARDS

C.I.D. DAY

PHOTO OPERATIONS CHECK LIST

0300	REPORT TO WORK AT NASA 25
0330	LEAVE NASA FOR BREAK RELEASE POINT
0430	START PHOTO RADIO CHECKS
0500	ON BOARD CAMERA CHECK
0505	PHOTO OPS VAN OPERATIONAL
0515	CAMERA STAND CHECK OUT
0600	FLASH BULB SYNC TEST
	GO/NO-GO WEATHER CHECK - J. COOPER
0615	ARM FLASH BULBS
0630	HARD LINE CAMERAS TEST
0650	ALL PHOTO OPERATIONS UP AND READY CHECK
0700	FIRST EARLY EVAC. TO C-7 17-22
0705	DUST CHECK - ARRIVAL CHECK
0715	VIDEO MONITOR IN PLACE AT 17-22
0730	SECOND EARLY EVAC. ARRIVAL CHECK
0800	GO/NO-GO VISUAL WEATHER CHECK - J. COOPER
0835	LAST EVAC. START RECORDERS, CALL IN STATION - START
0840	ASSEMBLY 8 PERSONNEL. 4 VEHICLES AT NORTH END
0845	LAST EVAC FROM CID SITE TO 17-22. DEPART TIME
0850	ARRIVAL OF LAST EVAC. AT 17-22 CALL IN TIME.
0851	READ FLIGHT CARD RULES
0855	NASA 25 LEAVES FOR 17-22
0900	BREAK RELEASE
0909	IMPACT

CONTROLLED IMPACT DEMONSTRATION PROGRAM

CID TEST FLIGHT

720B CID SYSTEMS AIRCRAFT PREFLIGHT UNMANNED

P-17-CID

CID FLIGHT CARDS

CID-84-35

CID FLIGHT PROCEDURES

FROM CID 84-28A

AMES RESEARCH CENTER

DRYDEN FLIGHT RESEARCH FACILITY

NOVEMBER 29, 1984

1	2.	READY FOR EGRESS
CP	3.	GUARD L/G HANDLE DOWN
GND		MLG Downlocks & Chocks - REMOVED
CP	4.	GUARD L/G HANDLE DOWN
GND		Nosewheel Chock - INSTALLED
		Nosegear Pin - REMOVED
21	5.	Brakes - SET
CP	6.	Brakes - SET; Parking Brake - OFF
CP	7.	Overhead Panel Ignition SWS (4) - Flight Start
TECH	8.	Engr. Panel Oil & Gen Cooling Sw. - OVERRIDE
TECH	9.	Fuel Bypass (4) - AUTO/CLOSED
TECH	10.	NASA Panel C/B #12 - IN
TECH	11.	NO LITE
TECH/CP	12.	Final Cockpit Scan - COMPLETE
TECH	13.	JPL Cockpit Camera - Swing into Place
NASA 25	14.	Egress COMPLETE & DOOR SECURE
1	15.	SPORT-NASA 1, RADIO CHECK
NASA 25	16.	LAKE BED CLEAR
NASA 25	17.	Nose Gear Chock - REMOVED
NASA 25	18.	AIRCRAFT CLEAR FOR BRAKE RELEASE
1	19.	With New Tape, S Band Recorders - ON
NASA 15/16	20.	With New Tape, S Band Recorders - ON

N. TAKEOFF - RCV - 09:00/08:30

1 1. Call for T/O Clearance

21 2. Trim - __________

21 3. 3-2-1 BRAKE RELEASE

NOTE: No Pitch Inputs Till Rotation

21 4. At 80 Knots: N.W. Steering - DISABLED

21 5. Call V1, VR, V2

21 6. UTILITY PRESS ______, POSITIVE RATE - GEAR UP

O. CID PROFILE

\- 1. Downwind:

FTE a. RADIO CHECK, PHOTO 2

21 b. RADIO CHECK, RON WAITE

CYC c. RADIO CHECK, SAF 1

CYC d. RADIO CHECK, DSO

21 e. Terminal Guide - ON

21 f. Auto throttles - ON

21 g. Throttles - SET FOR GO-AROUND

\- 2. FINAL

21 a. 1200 FT

21 b. 1000 FT

21 c. 500 FT: JPL Nose Camera - ON(Silent)

21 d. 400 FT

21 e. 300 FT

21 f. 200 FT

21	g. 150 FT:
21	: Batt. & Lights - ON (Silent)
21	: Recorders - On (Silent)
PHOTO 2	: Lakebed Cameras - On (Silent)
FTS	: Arm Sw - UP & HOLD (10 SEC) (Silent)
21	h. 100 FT: Cameras - On (Silent)
	If Go Around Made Above 150 FT;
	1. JPL Camera - OFF
	REPEAT CID PROFILE, Item P1
21	3. If Go Around Made Below 150 Ft;
21	a. JPL Camera - OFF
FTS	b. Dearm Sw - DEARM
FTS	c. Arm Sw Guard - DOWN
ALL	d. Go To LAND ON ABORT RUNWAY CHECKLIST
833	4. IMPACT
21	5. Antenna Disable Select Sw - DISABLE
FTS	6. After Slideout - Dearm Sw - DEARM
FTS	7. Arm Sw Guard - DOWN
1	8. NASA 25, YOU'RE CLEARED TO FOLLOW POST IMPACT GROUND OPS PLAN

APPENDIX N

CID PHOTOGRAPHY
MISSION CRITERIA

and

PHOTO SUPPORT READINESS CHECKLIST

CID PHOTOGRAPHY
MISSION CRITERIA

CID GROUND PHOTOGRAPHIC/VIDEO SYSTEM (GPVS)

____ Successful demonstration of the total integrated GPVS including remote operation, power and timing distribution, film and tape load/unload and processing, and equipment/personnel readiness, prior to CID.

____ Successful processing and printing of sample film and video from two flight activities.

REMOTE TRACKER MOUNTED CAMERA SYSTEM (UNMANNED)

____ Demonstrate remote tracker/van command/control operation from two flight activities which include file and tape loading, power and timing initiation, and remote camera(s).

____ Successful processing and printing of sample film and video from two flight activities.

TRACKER MOUNTED CAMERA SYSTEM (MANNED)

____ Demonstrate manned tracker operation from two flight activities which include film and tape loading, power and timing initiation, and camera(s) start.

____ Successful processing and printing of sample film and video from two flight activities.

REMOTE HIGH SPEED FILM VIDEO, SPECIALITY AND STILL CAMERA SYSTEM

____ Demonstrate remote operation of the system from two flight activities which include film and tape loading, power and timing initation and camera(s) start.

____ Successful processing and printing of sample film and video from the system from two flight activities.

DOCUMENTARY MOTION PICTURE CAMERA AND OTHERS (MANNED)

____ Demonstrate manned operation of the system from two flight activities, which include film loading, power and timing, initiation, and camera(s) start.

____ Successful processing and printing of sample film from the system from two flight activities.

CID PHOTOGRAPHY
MISSION CRITERIA

CID AIRBORNE PHOTOGRAHPIC/VIDEO SYSTEM (APVS)

____ Successful demonstration of the total integrated (APVS) including command in-flight operation, power and timing, video and tape loading/unload and processing prior to CID.

____ Successful processing and printing of sample film and video from two flight activities.

CABIN CLOSED CIRCUIT VIDEO CAMERA

____ Demonstrate operation from two flight activities which include tape load/unload, power-up and camera start.

____ Successful video tape and sample processing from two flight activities.

CID PHOTOGRAPHY
MISSION CRITERIA

HELICOPTER(S) AND P-3 PHOTOGRAPHIC/VIDEO SYSTEM

____ Successful demonstration of the two helicopters and P-3 aircraft photographic/video system including inflight operation, power, film and tape load/unload and processing prior to CID.

____ Successful processing and printing of sample film and video from two flight activities.

HIGH SPEED MOTION PICTURE/VIDEO CAMERA

____ Demonstrate in-flight CID following and camera operation from two CID manned lights which include film/tape load/unload, power and timing and camera(s) start.

____ Successful processing and printing of sample film/tape from two manned flights.

PHOTO SUPPORT READINESS CHECKLIST

1. _____ GROUND OPERATIONS PERSONNEL ROLL CALL AND RADIO CHECK (COUNT) - PHOTO 1 REPORTS TO NASA 25.

2. _____ ALL COMMUNICATIONS OPERATIONAL - UHF/VHF/CH2/CH3/CH1/FIRE NEW - PHOTO CHECK.

3. _____ ALL PRE-TAKEOFF AIRCRAFT SUPPORT EQUIPMENT IDENTIFIED, CHECKED, AND IN PLACE AT TAKEOFF POINT - NOSE, TAIL, AND CABIN.

4. _____ ALL PERSONNEL PARTICIPATING IN IMPACT DAY ACTIVITY ISSUED YELLOW FIRE PROTECTIVE COVERALLS, AND LAKEBED ACCESS CONTROLS IN PLACE.

5. _____ OPERATIONAL CONTROL AREA AND LAKEBED ACCESS CONTROLS IN PLACE.

6. _____ IMPACT SITE CLEARED OF ALL NON-MISSION PERSONNEL, EARLY EVACUATION.

7. _____ IMPACT SITE MISSION READY - ALL PHOTO EVACUATION SITE.

8. _____ BREATHING AIR EQUIPMENT AND SUPPORT PERSONNEL READY AND IN CONVOY - PHOTO READY.

9. _____ AFFTC FIRE DEPARTMENT BRIEFED AND IN POSITION TO SUPPORT MISSION AND PHOTOGRAPHERS.

10. _____ ALL CONVOY GROUND OPERATIONS PERSONNEL IDENTIFIED - ONBOARD CAMERAS - PHOTO DOCUMENTATION.

11. _____ ALL CONVOY AND LAKEBED VEHICLES IDENTIFIED AND PLACARDED (COUNT) PHOTO EVACUATION.

12. _____ JPL PHOTO READY TO SUPPORT MISSION: PHOTO 1 TO NASA 25. ALL SYSTEMS GO.

13. _____ ALL EQUIPMENT CLEAR OF AIRCRAFT - PHOTO DOCUMENTATION.

14. _____ ALL PERSONNEL OFF CID 720 AND CLEAR OF AIRCRAFT - READY FOR BRAKE RELEASE.

15. _____ RADIO CALL TO NASA 1 - IMPACT SITE CLEAR - CID 720 AND ALL GROUND OPERATIONS READY FOR BRAKE RELEASE AND TAKE OFF. PHOTO 1 START COUNT DOWN TO ALL PHOTOGRAPHERS.

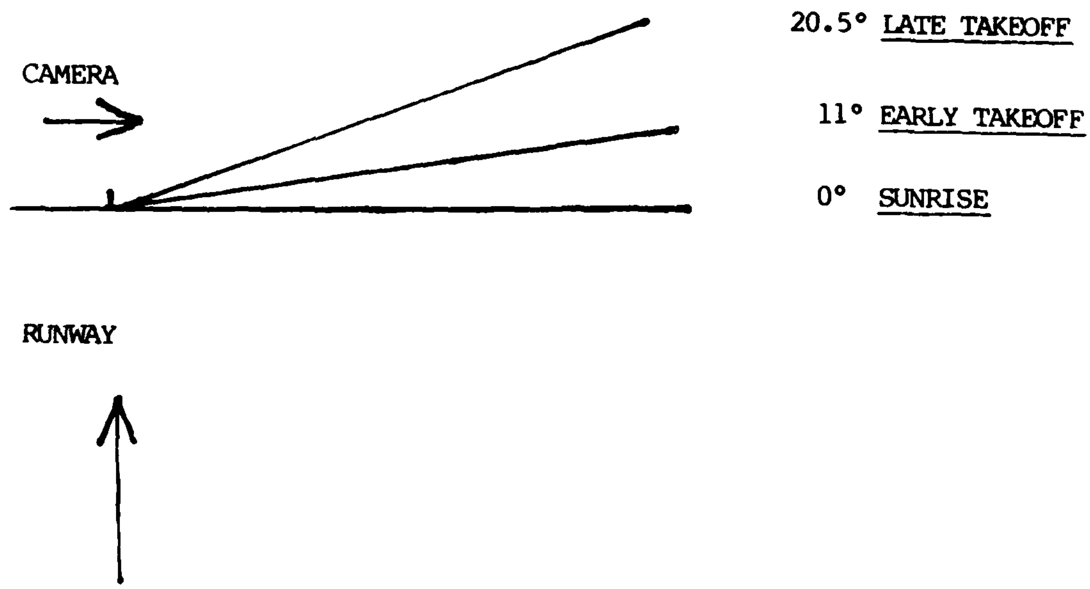
APPENDIX O

SUN POSITION - CID REMOTE SITE

SUN POSITION - CID REMOTE SITE

DECEMBER 1, 1984:

POSITION OF SUN	P.S.T.	ALTITUDE	AZIMUTH
SUNRISE	0640	0°	118°
EARLY TAKEOFF	0800	11°	126°
LATE TAKEOFF	0900	20.5°	136°



APPENDIX P

OPERATING RULES AND PROCEDURES: GO-NO-GO
JPL FILM AND VIDEO CAMERA SYSTEMS

OPERATING RULES AND PROCEDURES: GO-NO-GO

JPL FILM AND VIDEO CAMERA SYSTEMS

MISSION SEGMENT	NO-GO CRITERIA	PROCEDURES	DETECTION METHOD	COMMENTS
I. PRE-BRAKE RELEASE:				
GROUND PHOTO/VIDEO REMOTE TRACKER	ABORT	NONE	GREGOIRE VOICE ROGER BARNICKI	
MANNED TRACKER	CONTINUE	NONE		
REMOTE & SPECIALS	ABORT	NONE	OBSERVE LITES "ON" (INADVERTENT POWER TURN ON) THEN GREGOIRE VOICE/RADIO - R. BARNICKI.	
NO MORE THAN 20 MINUTES ELAPSED FROM PHOTO TEAM ARRIVAL AT 17/22.	ABORT	RELOAD LAKE-BED VIDEO CAMERAS		
DOCUMENTARY MOTION	CONTINUE	NONE	GREGOIRE WILL TIME.	
833 AIRBORNE PHOTO/VIDEO				
NOSE/TAIL/CABIN/ COCKPIT	CONTINUE	NONE		
HELO P-3 AIR SUPPORT	CONTINUE WITH TWO (2) OR MORE	NONE		

MISSION SEGMENT	OPERATING RULES-AIRBORNE	PROCEDURES	DETECTION METHOD	COMMENTS
	A. CONTINUE MISSION B. MAINTAIN HOLDING PATTERN C. LAND ON ABORT RUNWAY D. CONTINUE MISSION WITH NO-GO-AROUND. D1. CONTINUE MISSION WITH NO POSSIBLE LANDING. E. LAND ON NEAREST LAKEBED F. IMPACT OFF SITE G. TERMINATE	FLIGHT PROCEDURES		

MISSION SEGMENT	NO-GO CRITERIA	PROCEDURES	DETECTION METHOD	COMMENTS
II. TAKE-OFF ROLL:				
GROUND PHOTO				
PHOTO/VIDEO				
REMOTE TRACKER	A	FP A	GREGOIRE VOICE/RADIO TO BARNICKI	
MANNED TRACKER	A	FP A		
REMOTE & SPECIAL	A	FP A	OBSERVER LITES "ON" GREGOIRE VOICE/RADIO TO BARNICKI	LIGHT IS TO GO ON WITH POWER TO CAMERAS. SEEN BY AN OBSERVER.
DOC. MO/PIC MANNED	A	FP A		
833 AIRBORNE PHOTO/VIDEO				
NOSE/TAIL/CABIN/COCKPIT	A	FP A		
HELO P-3 AIR SUPPORT	A CONTINUES WITH ONE OR MORE	FP A		
III. PRE-BRAKE RELEASE				
GROUND PHOTO/VIDEO				
REMOTE TRACKER	ABORT	NONE	GREGOIRE VOICE/RADIO ROGER BARNICKI	
MANNED TRACKER	CONTINUE	NONE		
REMOTE & SPECIALS	ABORT	NONE	OBSERVE LITES "ON" (INADVERTENT POWER TURN ON) THEN GREGOIRE VOICE/ RADIO - R. BARNICKI	
NO MORE THAN 20 MINUTES ELAPSED FROM PHOTO TEAM ARRIVAL AT 17/22	ABORT	RELOAD LAKEBED VIDEO CAMERAS		
DOCUOMENTARY MOTION	CONTINUE	NONE	GREGOIRE WILL TIME	
833 AIRBORNE PHOTO/VIDEO				

MISSION SEGMENT	NO-GO CRITERIA	PROCEDURES	DETECTION METHOD	COMMENTS
III. PRE-BRAKE RELEASE: (CONTINUED)				
NOSE/TAIL/CABIN/COCKPIT	CONTINUE	NONE		
HELO P-3 AIR SUPPORT	CONTINUE WITH TWO (2) OR MORE	NONE		
IV. AIRBORNE CLIMB-PATTERN:				
GROUND PHOTO				
PHOTO/VIDEO				
REMOTE TRACKER	A	FP A	GREGOIRE VOICE/RADIO TO BARNICKI	
MANNED TRACKER	A	FP A		
REMOTE & SPECIAL	A	FP A	OBSERVER LITES "ON" GREGOIRE VOICE/RADIO TO BARNICKI	LIGHT IS TO GO ON WITH POWER TO CAMERAS. SEEN BY AN OBSERVER.
DOC. MO/PIC MANNED	A	FP A		
833 AIRBORNE PHOTO/VIDEO				
NOSE/TAIL/CABIN/COCKPIT	A	FP A		
HELO P-3 AIR SUPPORT	A CONTINUE WITH ONE OR MORE	FP A		
V. FINAL APPROACH:				
GROUND PHOTO				
PHOTO/VIDEO				
REMOTE TRACKER	A	FP A	GREGOIRE VOICE/RADIO TO BARNICKI	
MANNED TRACKER	A	FP A		

MISSION SEGMENT	NO-GO CRITERIA	PROCEDURES	DETECTION METHOD	COMMENTS
V. <u>FINAL APPROACH</u>:				
REMOTE & SPECIAL	A	FP A	OBSERVER LITES "ON" GREGOIRE VOICE/RADIO TO BARNICKI	LIGHT IS TO GO ON WITH POWER TO CAMERAS. SEEN BY AN OBSERVER.
DOC. MO/PIC MANNED	A	FP A		
833 AIRBORNE PHOTO/VIDEO				
NOSE/TAIL/CABIN/COCKPIT	A	FP A		
HELO P-3 AIR SUPPORT	A CONTINUE WITH ONE OR MORE	FP A		
VI. <u>FINAL APPROACH <400'</u>:				
GROUND PHOTO				
PHOTO/VIDEO				
REMOTE TRACKER	A	FP A	VAN OPS AND/OR OBSERVATION LIGHTS	
MANNED TRACKER	A	FP A		
REMOTE & SPECIAL	A	FP A	OBSERVATION LIGHT "ON" VOICE/RADIO TO BARNICKI	
DOC. MO/PIC MANNED	A	FP A		
833 AIRBORNE				
NOSE/TAIL/CABIN/COCKPIT	A	FP A		
HELO P-3 AIR SUPPORT	A	FP A	RADIO/AIR	

GO-NO-GO

IN PHOTOGRAPHIC TERMS, WEATHER WAS THE GO-NO-GO DECIDING FACTOR THAT HAD TO BE CONSIDERED. THE OFFICIAL POSITION WAS STATED AS FOLLOWS:

WEATHER CONDITIONS FOR THE CID MISSION WILL BE AS FOLLOWS:

1. WINDS LESS THAN 5 KNOTS AS REPORTED BY EDWARDS TOWER.

2. NEGLIGIBLE TURBULENCE AS REPORTED BY A SOUNDING AIRCRAFT LESS THAN 30 MINUTES PRIOR TO CID BREAK RELEASE.

3. VISIBILITY GREATER THAN 12 MILES, OR AS REQUIRED BY THE CID DIRECTOR OF PHOTOGRAPHY.

4. RPV PILOT CALL ON WINDS AND TURBULENCE.

THE GO-NO-GO RULES FOR THE VARIOUS MISSION SEGMENTS ARE DEFINED IN THE LIST THAT FOLLOWS.

APPENDIX Q

INTEROFFICE MEMORANDUM
FROM: John E. Reed
SUBJECT: INFORMATION: Full-Scale Transport
Controlled Impact Demonstration
Program - Public Affairs Interface
Apr 20 1984

Full-Scale Transport Controlled Impact Demonstration Program

SUBJECT: INFORMATION: Full-Scale Transport Controlled Impact Demonstration Program--Public Affairs Interface

DATE: APR 2 0 1984

FROM: John E. Reed
Program Manager, Full-Scale Transport Controlled Impact Demonstration Program, ACT-300C

TO: Distribution

The NASA-Ames/Dryden Flight Research Facility (NASA-A/DFRF) (Ralph Jackson, Public Affairs Officer (PAO)) has developed a DRAFT NASA Controlled Impact Demonstration (CID) News Policy and Public Affairs Plan which has been submitted to the NASA headquarters PAO. After NASA headquarters review and concurrence, the policy/plan is to be provided to the FAA headquarters PAO for review (and subsequent concurrence). When both parties have concurred, a joint package will be released and made available to all NASA and FAA organizations and the electronic/print media (if appropriate).

The CID Management Plan (DOT/FAA/CT-82/151) dated January 1984 generally specifies an "engineering" photographic and video documentation plan. On March 22, 1984, a more comprehensive DRAFT engineering Photographic/Video Coverage Plan was provided to the CID team and Test Management Council members for review and comments. Simultaneously, the appropriate FAA headquarters and NASA-A/DFRF PAO's were provided copies for their review.

The DRAFT engineering Photographic/Video Coverage Plan (prepared by the CID Program Office) included a statement of CID program and experiment(s) requirements/needs prepared from inputs provided by the FAA Technical Center and NASA-Langley Research Center. Folded within the document is a photographic implementation plan from the Jet Propulsion Laboratory (JPL) (FAA Technical Center contractor) in response to those requirements/needs.

Neither the Management Plan nor the Photographic/Video Coverage Plan address the public affairs requirements, needs, and plan. The CID program will make available to the PAO's all engineering motion, still, and video documentation on a timely basis. Some current confusion has implied that JPL is to provide the CID public affairs photographic/video coverage documentation. This is not the case. JPL is providing only "engineering" photographic/video coverage documentation.

NASA-A/DFRF PAO has officially requested the NASA-Johnson Space Center (JSC), Photographic Technology Division, and their contractor (Taft Broadcasting) to assist NASA-A/DFRF with television coverage of the CID. At this date, NASA-JSC (Taft Broadcasting) is not officially onboard, but unofficial coordination is in progress with FAA/JPL and the NASA-A/DFRF CID Project Office. Presently, NASA-A/DFRF does not have sufficient ground antenna system capability to support the remote control of the CID vehicle and real-time airborne video coverage. Therefore, real-time airborne PAO video coverage is impractical.

A DRAFT "Ground Operations Plan" is to be prepared by NASA-A/DFRF which will coordinate (or fold in) the CID photographic/video coverage plan, public affairs plan, pre- and post-impact security, crash fire rescue, securing the experiments, and the post-impact investigation plan. This draft is to be available the week of April 30, 1984, for review by FAA and NASA.

With the above as current background, it has been recommended that the CID program develop a document which would further delineate the interface with the public affairs activities. Attachment 1 provides a set of comments and guidelines from the CID program which should be considered and may be in the development of the official Public Affairs Plan.

Comments are requested and should be provided to this office as soon as possible.

#

Attachment

Distribution:
See Attached List

ATTACHMENT 1

CONTROLLED IMPACT DEMONSTRATION/PUBLIC AFFAIRS INTERFACE

PUBLIC AFFAIRS

The Controlled Impact Demonstration (CID) Program and Project Offices are maintaining close coordination with the Federal Aviation Administration (FAA) headquarters and National Aeronautics and Space Administration (NASA)-Ames/Dryden Flight Research Facility (NASA-A/DFRF) Public Affairs Offices (PAO) in order for the timely transfer of information and the development of guidelines for a public affairs plan. It is the intent of the CID program to provide to the FAA and NASA PAO's and the news media (to the fullest extent possible within the constraints of the CID engineering research program) all information as it becomes available. The following are comments and/or guidelines for the CID/public affairs interfaces.

ELECTRONIC AND PRINT MEDIA

It is recognized by all CID participating organizations that the CID is not a "low-key" research activity and could have far reaching implications for future transport aircraft. As this effort is on the increase in publicity, and in order to serve equally a large number of electronic and print media, the CID team suggests the following:

1. News Media Interviews and Tours - The CID program cannot support individual news media interviews and tours. The demands of the CID schedule, the potential volume of news media requests, and political considerations relative to future FAA regulatory actions make it imperative that interviews and tours are strictly controlled. Joint program news media conferences are the acceptable alternative to individual interviews and tours. The CID program would suggest that the first of these conferences be conducted after the first antimisting kerosene (AMK) system flight (estimated mid-May 1984).

   Tours through the CID vehicle, remote control cockpit, etc., are currently being discouraged as the work level on the aircraft and ground facilities has been high and interruptions cannot be tolerated. In conjunction with the above proposed news media conference/briefing, a tour of the CID vehicle, remote control cockpit, control room, press site, impact site, etc., would be conducted.

2. News Media Accreditation - FAA and NASA PAO's will develop procedures, requests, badging, etc. CID has no comments or actions.

3. Press Kit - CID program suggests a standard press kit/information package be assembled as soon as possible. This package could contain the Management Plan, 1 to 1-1/2 page description of the experiment(s), remote control system (airborne and ground), major suporting facilities, etc. A series of photographs showing the above should be included.

FAA and NASA PAO's are to coordinate and prepare with inputs and review by the appropriate CID team members. The FAA PAO is to prepare the press kits. Joint FAA and NASA news releases will be coordinated and made available to the news media.

See below for photograhic/video film availability/plan.

NEWS CENTER

The NASA-A/DFRF News Center will be available for the CID. CID has no comments or actions.

PRESS SITE

A press site (Attachment 2) will be established on the edge of Rogers Dry Lake to permit the news media to view the impact demonstration. The news media, guests, or VIP's will not be allowed to go to the site following the impact for safety reasons. Only the Air Force Flight Test Center (AFFTC) crash fire rescue, designated CID program personnel, and the Jet Propulsion Laboratory (JPL) photographic team will be allowed at the impact site. The JPL team has had fire training at Edwards Air Force Base.

NEWS MEDIA CONFERENCE/BRIEFINGS

Discussions with the NASA-A/DFRF PAO would suggest a single announced (similar to Space Shuttle) conference/briefing be conducted after the first AMK system flight (estimated mid-May). The appropriate FAA and NASA management, CID team and supporting technical personnel would participate and be prepared to respond to questions relative to the technical program details as well as future research and regulatory plans.

Prior to or after the conference/briefing, a tour of the CID vehicle, remote control cockpit, control room, press site, and imapct site would be conducted.

The post-CID briefing will be conducted in the NASA-A/DFRF auditorium. It may be possible that this briefing (with CID video) could be made available to other FAA and NASA offices via satellite transmissions. Again, the appropriate FAA and NASA management, CID team, and supporting technical personnel would participate as in the above pre-CID conference/briefing.

PHOTOGRAPHIC/VIDEO COVERAGE

The CID engineering ground and airborne photographic/video coverage documentation will be made available to the NASA-A/DFRF PAO through the FAA/JPL efforts. Selected impact site still film will be made available for possible on-site processing and print dissemination. CID airborne and ground video will be previewed, and that deemed appropriate for news media use will be processed and edited copies made available as soon after impact as possible. Another large quantity of airborne and ground engineering high speed motion picture film will be made available at a later date, as these films are sensitive and require special processing at JPL and the NASA-Langley Research Center.

We anticipate that a quality photographic and video package should be available to the news media by the conclusion of the post-impact briefing.

GUESTS/VIP'S

The CID program team has not planned to invite guests or VIP's to the event. It is expected that key FAA and NASA management, CID experimentors/contractors, and local AFFTC will be in attendance (as well as CID team wives, families, and friends). We could expect that FAA and NASA management may invite many Government VIP's, Congressional representatives and staffs, airframe/engine manufacturers, airlines, and other industry VIP's. A number of foreign organizations have indicated their plan to attend. The CID program and FAA/NASA PAO's would like to be apprised of that potential list as soon as possible in order to develop the appropriate capability and arrangements for guests and VIP's to view the CID. In the past, if parties have indicated they wish to attend, we suggested they do so in writing to the FAA headquarters PAO for accountability and who is planning to attend.

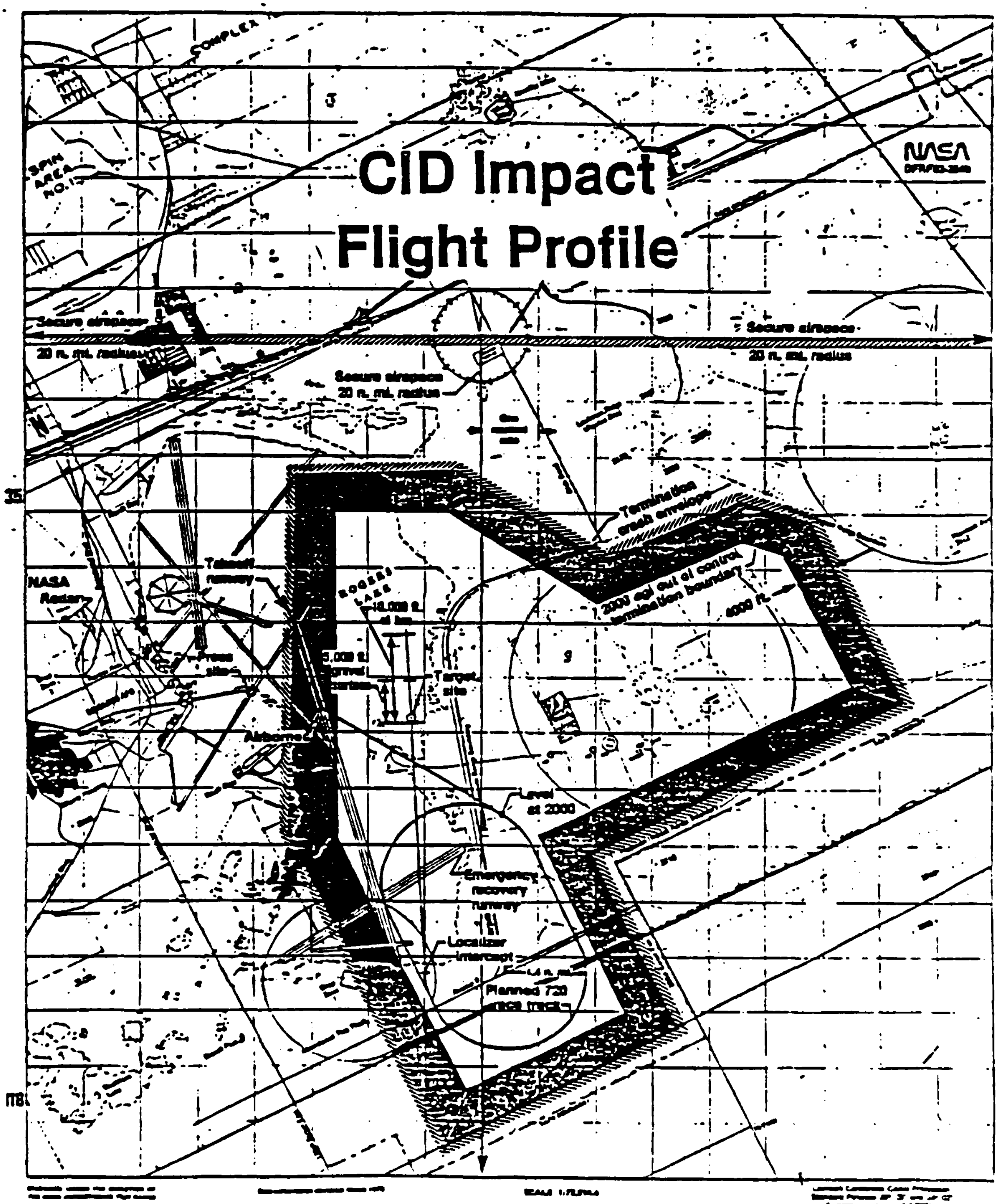
As the CID schedule envelope opens July 21-29, and due to extensive 1984 summer Olympic activities building up to start on July 28, 1984, in Los Angeles, California, the air reservations (to Los Angeles), automobile rentals, and motel/hotel accommodations may be difficult or impossible to acquire. Therefore, the CID program team has no plans to accommodate guests and/or VIP's for motels/hotels (a listing is available), transportation, etc. One-on-one special arrangements could be made for VIP transportation as there are a quantity of the team members who depart daily from the Lancaster-Palmdale area, but transportation from and returning to Los Angeles is not planned for guests/VIP's.

POST-IMPACT SOCIAL DEBRIEFING

As so goes all flight test programs, a very informal social debriefing will be conducted later in the day of the CID. Arrangements will be made by the CID program team, and invitations will be made on a one-on-one basis by FAA and NASA officials.

Limited FAA and NASA PAO interface.

ATTACHMENT 2



APPENDIX R

JPL
SHIPPERS
FOR FAA FLIGHT TEST

VANDENBERG EQUIPMENT
FOR FAA FLIGHT TEST

MISCELLANEOUS SOURCE
EQUIPMENT
FOR FAA FLIGHT TEST

JPL

SHIPPERS

FOR FAA FLIGHT TEST

NUMBER	INVENTORY	PRICE	DATE
V-04190	Strobe Battery (to be repaired)	$ -0-	3/11/81
V-05131	Kodak Lens Anastigmat 63mm F2.7,	200.00	3/27/81
"	with lens hood and two lens caps	-0-	"
"	Kodak "C" Mount Adapter	50.00	"
"	5/16 inch extension	25.00	"
X-08791	GE Radio - 2 Way	635.38	6/13/83
"	" " " "	667.32	"
"	" " " "	635.78	"
"	" " " "	667.32	"
"	Angeniux 40X400 Zoom Lens	2,450.00	"
X-11449	Film Projector, Kodak	750.00	8/11/83
"	(2) Northridge Research Camera	3,600.00	"
"	Cohn TV Camera	2,400.00	"
"	Kintel TV Camera Mount	4,000.00	"
X-12739	Tape, 18mm, 3/4 inch	300.00	8/25/83
X-13856	Camera Miliken 16mm S/N 4572 Lens	10,000.00	9/20/83
	10mm 830138	300.00	
X-14307	Nikon Camera FM 3121730 with Case & Acc.	245.00	9/23/83
X-14251	Photo Sonics Inc. 16mm IP Camera		9-29-83
"	S/N 75	8,000.00	"
"	S/N 12	8,000.00	"
"	S/N 76	8,000.00	"
"	S/N 18	8,000.00	"
X-14256	Battery Case with Power Cable	-0-	10/07/83
"	Camera - 16mm IVN 200/SN659	15,000.00	"
"	Lens - Kinoptic #49584-85.7	500.00	"
"	Bore Site	1,400.00	"
SUBTOTAL		$75,825.80	

NUMBER	INVENTORY	PRICE	DATE
X-17514	Panasonic MNV-8950 Video Cassette	$ 2,000.00	11/22/83
"	Tri Tronics PCSM-5600 Phase Controlled	1,000.00	"
"	Shutter Camera	15,000.00	"
"	Tripod	500.00	"
"	M71 Battery	1,000.00	"
X-18239	Camera-Nikon Mod F2AS S/N F7923789	8,579.22	12/06/83
"	Bushnell Binoculars Mod 176 S/N A191468	135.00	"
"	Lens 800mm	500.00	"
"	Camera Arriflex Mod 3000 S/N 7476	2,434.95	"
X18710	Nikon Camera Mod 10050 S/N 3117507	1,375.00	12/09/83
"	28mm F/3.5 Lens S/N 379095	250.00	"
"	Flash	150.00	"
X-19504	Power Supply Labboa L-P 1224	300.00	12/22/83
"	Battery Pack UC 2004 10047213-1 Rer	150.00	"
X-19653	Viewgraphs	150.00	12/29/83
Y-03743	Battery Acc. M71 TRW 2004A14	-0-	3/13/84
	10028180 S/N 303	-0-	"
Y-03746	Cool Light Sun Gun	200.00	3/14/84
"	Goldtop Alan Gordon 28U DC Battery Belt	550.00	"
"	Cine 60 12U DC Battery Belt	500.00	"
"	Arriflex S 16mm Motion Picture Camera	5,000.00	"
"	with Lenses 10mm, 25mm, 50mm	1,000.00	"
"	Saghtler Tripod & Fluid Head	2,500.00	"
Y-06299	Camera Photosonics 16mm Ip S/N 15	10,000.00	4/11/84
E-7891	Lameda Regulated Power Supply	300.00	2/29/84
"	Model #LH 125 FM Loan Pool #1224	300.00	"
Y-01894	Empty Battery, Electric Storage	-0-	2/10/84
"	Last Contained Corrosive Material	-0-	"
Y-01414	Camera Control Mod. STU 605A	11,928.00	2/08/84
	Cable-Special Purpose - 3 Conductor	609.00	2/08/84
SUBTOTAL		$66,411.17	

NUMBER	INVENTORY	PRICE	DATE
Y-09505	16 VN Photosonics Camera S/N 1028	$ 2,000.00	5/31/84
"	100' Daylight Film Mag S/N 1073	3,000.00	"
"	Boresight Tool S/N 191	1,500.00	"
"	CTPG/LED	800.00	"
"	Ruggedized Timing	1,000.00	"
"	10mm F11.8 Lens CM143	300.00	"
Y-09946	Recorder Hurd 762/108 with Shock	24,000.00	6/13/84
"	(2) Video View Finder Power		"
"	Power Pack 28 Volt		"
"	Control Box 763-105		"
"	Converter U552-7 84-108		"
"	High Speed Video Camera		"
"	Power Cord		"
Y-09510	Metal Plate	-0-	6/07/84
Y-09508	Batteries-Dry	200.00	6/06/84
Y-11615	400' Rolls 7296 Work Print Documentation	2,000.00	7/05/84
Y-12386	Generator Time P/U	675.00	7/20/84
Y-11522	18 Scaffolds Double Wide	100.00	7/09/84
"	6 Scaffolds Half Singles	20.00	"
"	Board 10' X 12'	15.00	"
"	Double Hook Rods	15.00	"
Y-12722	Microwave Unit	5,000.00	7/24/84
"	Horn	500.00	"
"	Transmitter	5,000.00	"
E-8015	Batteries	200.00	6/28/84
"	Assorted Cables	500.00	"
SUBTOTAL		$46,825.00	

NUMBER	INVENTORY	PRICE	DATE
Y-12946	Camera, Nikon with Motor Drive Lenses	$ 529.00	8/05/84
"	Camera, Nikon with Motor Drive	288.35	"
"	Camera, Arriflex with Lenses	2,434.00	"
"	Camera, Arriflex with Lenses	1,885.00	"
"	Camera, Arriflex S-16S-BGS	3,488.00	"
"	Arriflex SRI with Lenses & Acc.	25,429.75	"
"	Camera, Miliken High Speed	4,150.00	"
"	" " " "	4,677.55	"
E-8056	Camera Photosonics	50,000.00	"
	Magazine Plotosonics	1,000.00	"
	Lens Kinoptic 5.7	500.00	"
	Bore Site	200.00	"
	Lens Zoom - Angeniux _	1,000.00	"
Y-16378	Electric Extension Cords	600.00	9/11/84
Y-16237	Tripod Pro, Jr.	125.00	9/21/84
Y-16246	Honda Generators	3,000.00	9/27/84
"	Gasoline	-0-	"
"	Batteries	150.00	"
"	Generators	3,000.00	"
Y-16632	Dynalens Model	8,000.00	10/01/84
Y-16639	Sony 2860 3/4" Video Recorder	2,400.00	10/02/84
Y-16638	Mitchell 35mm Motion Picture Camera	2,500.00	"
Y-16637	Tri-Tronics High Speed Video	20,000.00	"
Y-17703	Generator	2,000.00	10/09/84
Y-17630	(2) Video Tape	30.00	"
X-15616	Timing Light Generator	800.00	10/18/84
"	5.7mm Lens	500.00	"
"	Time Pulse Generator	900.00	"
Y-18194	Recorder Audio Tronics 147	100.00	10/18/84
Y-19072	Camera, Nikon	8,579.00	10/20/84
"	Camera, Nikon with Motor Drive	288.35	"
"	Nikon with Motor Drive	262.00	"
"	Camera, Arriflex	1,885.00	"
"	Camera Arriflex S3000	2,434.95	"
SUBTOTAL		$153,135.95	

NUMBER	INVENTORY	PRICE	DATE
Y-19072	Camera, Arriflex SE w/Lenses	$25,429.75	10/20/84
"	Camera, Miliken High Speed	4,677.55	"
"	Camera, Miliken High Speed	4,150.00	"
Y-18602	Typewriter	800.00	"
Y-18606	16mm Arriflex Camera Outfit w/Case	7,807.00	10/23/84
"	Nikon FE	466.00	"
"	Magra Recorder	1,766.00	"
"	Cine Pro Jr. Tripod	50.00	"
"	O'Conner Fluid Tripod Heads	250.00	"
"	Arriflex 400' Film Mag	800.00	"
"	Hassleblad L Camera w/Acc.	1,059.00	"
"	Nikon	8,519.00	"
Y-18645	Nikon FE 2 w/Motor & 500mm Lenses	466.38	11/01/84
"	Hassleblad Camera Kit	412.00	"
"	Hassleblad w/Acc & Case	1,059.00	"
"	Nikon F2 Camera w/Acc.	8,579.22	"
Y-18641	(2) General Electric Hard Radio	1,271.56	"
"	Hassleblad Elm Camera w/Acc.	329.50	"
"	Tripod 2 Quickset	150.00	"
Y-19656	AC Line Conditioner ELQUAR	400.00	11/06/84
"	" " " Sorenson	400.00	"
Y-19489	Cine Kodak 150mm Lens	250.00	11/06/84
"	Tayler Hobson 100mm Lens	200.00	"
"	Omnippon 75mm Lens	150.00	"
"	(2) Omnippon 50mm Lens	100.00	"
"	(2) Omnippon 25mm Lens	100.00	"
"	Bell & Howell/Angeniux 100mm Lens	100.00	"
"	Cannon 15-15mm Zoom Lens	1,000.00	"
"	Ikegami Picture Monitor	350.00	"
"	Sony Monitor	3,000.00	"
	SUBTOTAL	$74,091.96	

NUMBER	INVENTORY	PRICE	DATE
Y-19378	Dewar Liquid Nitrogen	$ 1,500.00	11/08/84
Y-11066	Inframetric IR Camera	26,125.00	"
"	Sanyo 7100 Video Recorder	2,650.00	"
"	Javelen Monitor	500.00	6/26/84
"	Video Color TV & Monitor	5,500.00	"
"	Dewars	150.00	"
"	Telescopes Infametrics	6,500.00	"
"	Misc. Lens & Filters	5,000.00	"
"	Polerid Tripod & Acc.	2,000.00	"
"	Barnes Black Body Source	1,500.00	"
"	Video Recorder & Acc.	1,150.00	"
Y-18596	(2) Sony 2860 Video Cassette Recorder	10,000.00	11/06/84
"	Tektronix 528 Waveform Monitor	2,000.00	"
"	Sharp XC700 Camera	2,900.00	"
"	(2) Norelco LDH20 Camera	5,800.00	"
"	(2) Vinten Cameras	10,000.00	"
"	Vinten Camera	5,000.00	"
"	JVC CR4400 Video Cassette Recorder	5,000.00	"
"	Misc. Support Equipment (Cables, Tripod & Dry Batteries)	1,000.00	"
"	(2) Sony 5800 Video Cassette Recorders	14,000.00	"
"	Sony 5850 " " "	7,000.00	"
"	Sony RM440 Editing Controller	500.00	"
"	(3) Sony PVNV 8200T Color Monitors	3,000.00	"
"	Sony KV 1920 Television Monitor	500.00	"
Y-19375	FLIR, Model 200A	80,000.00	"
"	Test Stand	500.00	"
"	Recharge Unit	500.00	"
"	Video Recorder	600.00	"
"	IDP Module	1,000.00	"
"	Video Monitor, Sony	600.00	"
"	Misc Tools	200.00	"
	SUBTOTAL	$202,675.00	
	GRAND TOTAL	$618,964.88	

VANDENBERG EQUIPMENT

FOR FAA FLIGHT TEST

IDENTIFICATION	ESTIMATED VALUE
Mount	$250,000.00
Mount	250,000.00
Ground	180,000.00
35mm Camera	28,000.00
TOTAL	$708,000.00

MISCELLANEOUS SOURCE
EQUIPMENT
FOR FAA FLIGHT TEST

SOURCE OF EQUIPMENT	TYPE OF EQUIPMENT	ESTIMATED VALUE
NASA Dryden and Vandenberg	Automobiles	$ 50,000.00
JPL and Vandenberg	Government Vehicles	20,000.00
Dalgren Navel Weapons		150,000.00
NASA Ames		160,000.00
Navy - Pt. Mugu		60,000.00
Navy- China Lake		160,000.00
TOTAL		$600,000.00

APPENDIX S

AIRBORNE CONTROL SYSTEM DESCRIPTION INTERFACE WITH EXPERIMENTS

AIRBORNE CONTROL SYSTEM DESCRIPTION INTERFACE WITH EXPERIMENTS

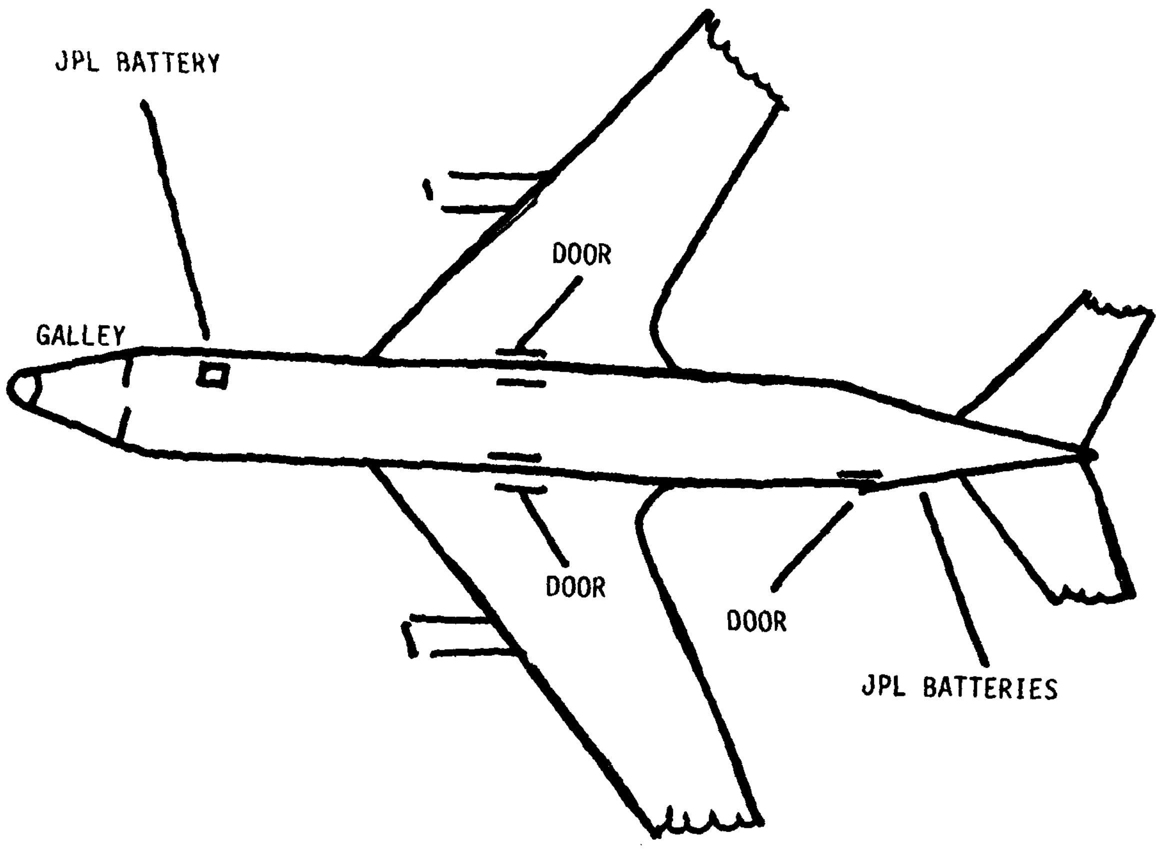
The uplink control system interfaces with and controls several systems: the JPL ground cameras, the NASA Langley recorder, the battery activation, and the onboard cameras.

The JPL onboard camera system consists of the following: located in the nose of the 720 aircraft and in the cockpit doorway are two high speed cameras to record the final moments of the 720's flight. Power to the cameras consists of five 6V batteries to provide 30 VDC power to the cameras. The battery pack is located in the flight attendant's compartment, right-hand side of the aircraft. On and off control is accomplished through a series of dedicated relays. The relays are energized from the uplink electronics box. The JPL camera logic is such that the relays can be energized or de-energized from a command via the RCV control facility. Once the relays are energized they provide battery power even if the uplink electronic system is turned off. This was done to insure that the JPL onbaoard cameras continued to run even if the uplink system was destroyed on impact.

A third camera and battery pack are located in the tail of the aircraft. The battery pack is located on the left hand side of the 720 aircraft and the camera is mounted near the top of the rudder on the leading edge. A neon lamp driver is located on the NASA pallet to provide a timed source for the nose and cockpit camera. A LED lamp-driver unit is located near the tail camera battery to provide a time base for the tail camera.

The nose camera is operated by a dedicated switch in the RCV cockpit. The onboard cockpit and tail cameras are controlled by the same switch which turns on the Langley cameras. To provide a visible means for the ground camera crew to synchronize their operation with the 720 cameras, the activation of the cockpit camera also activates the inboard and outboard landing lights (see Figure __ __). This is accomplished through a dedicated relay which receives power from the front camera battery pack.

BATTERIES ONBOARD CAMERA POWER
HAZARD LAYOUT



BATTERY REMOVAL POST-CRASH

SAFETY TEAM - BATTERY LOCATIONS

JPL FWD	10 EACH DRY CELL CARDON/ZINC LOCATION - B.S 140 R/H
JPL AFT	5 EACH DRY CELL/ZINC LOCATION B.S. 2080 L/H AFT-SIDE MOUNTED ON PARTITION

APPENDIX T

PHOTOGRAPHY TEAM
CONTROLLED IMPACT DEMONSTRATION

PHOTOGRAPHY TEAM
CONTROLLED IMPACT DEMONSTRATION

NAME	TASK	AFFILIATION	VEHICLE	EVAC. TIME	POSITION AT IMPACT
ARREOLA, H.	MAINTENANCE/SET-UP & TEST	VAFB	TBD	0840	17/22
BAILEY R.	VIDEO SUPPORT/HAND HELD	ZYBION	POV	0700	17/22
BIXLER, W.	HARD LINE REMOTE	JPL	JPL AUTO (HANSEN)	0700	17/22
BORLAND, D.	TRACKER LOADER	VAFB	TBD	0840	17/22
BORST, C.	VIDEO/RESCUE TEAM	JPL	JPL AUTO TO FIRE STATION	N/A	FIRE TRUCK
BRADLEY, D.	P-3 ORION PHOTOGRAPHER	PT. MUGU	COURTESY CAR	N/A	P-3 ORION
BRIDGES, S.	VIDEO AT SITE	JPL	JPL AUTO	0700	17/22
BURKE, E.	STILL SUPPORT	JPL	JPL AUTO/ PRESS	0700	C7/PRESS
BURKE, A.	RECORDER/LEAVE WITH NASA 25 AT 0300	JPL	TO FOLLOW NASA 25	N/A	17/22
BYERS, R.	EQUIPMENT RETRIEVAL	JPL/ETS	N/A	N/A	N/A
CHANDLESS, M	FILM EXPEDITOR/ CUSTODIAN	JPL	JPL AUTO	N/A	NASA
DAWSON, J.	PRE-FLIGHT M/P/PRESS/VIP PASS, PRESS CONFERENCE	JPL	NASA 7230	N/A	17/22 & C7 PRESS
DODDS, R.	HIGH SPEED VIDEO	SYMBOLIZED	POV	0700	C7/PRESS
ESCARSEGA, O.	MAINTENANCE SUPPORT/SET-UP & TEST	VAFB	TBD	0700	17/22
FAIL, T.	REMOTE	VAFB	TBD	0700	C7/PRESS
FENTON, E.	VIDEO SUPPORT	SYMBOLIZED SYSTEMS	POV/PRESS	0700	C7

PHOTOGRAPHY TEAM
CONTROLLED IMPACT DEMONSTRATION

NAME	TASK	AFFILIATION	VEHICLE	EVAC. TIME	POSITION AT IMPACT
FRANZ, E.	ELECTRONIC MAINTENANCE	VAFB	TBD	0840	17/22
FROST, D.	VIDEO/HAND HELD AT 17/22 TRACKER CID SITE	ZYBION	POV	0700	17/22
GALLAGHER, J	P-3 ORION PHOTOGRAPHER	PT. MUGU	NEXT DAY	N/A	P-3 ORION
GIBSON, R.	TIMING	VAFB	TBD	0840	17/22
GLAZER, S.	IR CAMERA SET-UP	JPL	JPL AUTO/ PRESS	0700	C7
GREGOIRE, J.	GROUND PHOTO DIRECTOR/ LEAVE AT 0300	JPL	NASA 25/ PRESS	NASA 25 TO SITE	17/22 ALL PASSES
HACHSTELLER, J.	P-3 ORION PHOTOGRAPHER	PT. MUGU	COURTESY CAR	N/A	P-3 ORION
HAGOOD, R.	IR CAMERA SET-UP	JPL	TBD/PRESS	0700	C7
HANCHETT, G.	VIDEO/RESCUE TEAM AT 0700	JPL	FIRE TRUCK/ JPL AUTO	N/A	FIRE TRUCK
HANSEN, R.	HARD LINE REMOTE	JPL	JPL AUTO (MAUGHAN)	0700	17/22
HEAGY, R.	VIDEO SET-UP	SYMBOLIZED	CO. AUTO/ PRESS	0700	C7
HEWITT, J.	STILL SUPPORT (BOSS)	JPL	JPL AUTO/ PRESS	0700	C7
HORNANDAY, B.	IR CAMERA SET-UP	JPL	JPL AUTO/ PRESS	0700	C7
KARUSZ, J	P-3 ORION PHOTOGRAPHER	PT. MUGU	COURTESY CAR	N/A	P-3 ORION
KIKKER, S.	AMK SUPPORT	JPL	POV/PRESS	0700	C7
KRURGER, E.	MAINTENANCE/SET-UP & TEST	VAFB	TBD	0840	17/22

PHOTOGRAPHY TEAM
CONTROLLED IMPACT DEMONSTRATION

NAME	TASK	AFFILIATION	VEHICLE	EVAC. TIME	POSITION AT IMPACT
LACHATA, C.	SET UP STILL AT SITE/ VIP PHOTOGRAPHER	JPL	ETS-JPL/ETS AUTO	N/A	NASA
MACBANE, H.	REMOTE	NSWC	COURTESY CAR	0840	C7/PRESS
MANENSE, M.	VIDEO MONITOR/ DUPLICATIONS	JPL	ETS-JPL/ETS AUTO	0700	17/22
MARKS, R.	PRE-FLIGHT VIDEO/ LEAVE WITH DAWSON	FAA/PRESS	NASA 7032	SAT AM	17/22
MAUGHAN, G.	STILL SUPPORT/RESCUE TEAM	JPL	JPL AUTO TO FIRE STATION	N/A	FIRE TRUCK
MCGHEE, D.(ALT)	VIDEO SUPPORT	ZYBION	POV/PRESS	0700	17/22
NAGY, J.	HIGH SPEED VIDEO SUPPORT	SYMBOLIZED	POV	0840	17/22
NATALE, C.	VIDEO SUPPORT	VISUAL INST.	POV	0700	C7
NEUHAUSER, P.	P-3 ORION PHOTOG.	JPL	JPL AUTO TO GET ON POST	N/A	P-3 ORION
OSTER, R. (ALT)	GENERATOR OPERATOR	JPL/ TABLE MT.	JPL/ETS AUTO (VARLEY)	0700	C7 or 17/22 PRESS PASS
PATTERSON, D.	CHASE PLANE PHOTOG./ FILM RETRIEVAL	JPL	JPL AUTO (AM)	N/A	CHASE PLANE
PENDLEY, G.	VIDEO SUPPORT	VISUAL INST.	POV/PRESS	0700	C/7
RICHARDS, B.	P-3 ORION PHOTOGRAPHER	PT. MUGU	COURTESY CAR	N/A	P-3 ORION
ROWE, W.	M/P PHOTOGRAPHER/ CONTROL ROOM	JPL	JPL/ETS AUTO	SAT AM	CONTROL ROOM
SHIPMAN, W.	REMOTE CONTROL	NSWC	POV/PRESS	N/A	C7
SMITHER, R.	AMK SUPPORT	JPL	POV/PRESS(AM)	0700	C7

PHOTOGRAPHY TEAM
CONTROLLED IMPACT DEMONSTRATION

NAME	TASK	AFFILIATION	VEHICLE	EVAC. TIME	POSITION AT IMPACT
STASHAK, W.	REMOTE/TRACKER	VAFB	TBD/PRESS	0700	C7
SZCZUROSKI, F.	TRACKER	VAFB	TBD	0700	17/22
TIBBITTS, B.	ON BOARD CAMERAS HELIO PHOTO COORDINATION	JPL/ETS	JPL/ETS AUTO	0700	AGENT AT LARGE
TRIMM, P.	OPERATOR	VAFB	TBD	0840	17/22
TROMBECKY, B.	HELIO PHOTOGRAPHER/ STILL	PT. MUGU	POV TO BASE/ PRESS	N/A	ARMY HELIO
VARLEY, D.	GENERATOR OPERATOR	JPL	POV TO ETS-JPL/ETS AUTO	0840	17/22
VALLELEY, J.	HELIO PHOTOGRAPHER/ VIDEO	FAA	POV/PRESS AM	N/A	N/A
WEATHERFORD, J.	H/S VIDEO	SPIN PHYSICS	POV/PRESS	0700	C7
WHIPPIE, W.	VIDEO SUPPORT	SPIN PHYSICS	POV/PRESS AM	0700	C7
WINEY, G.	HELIO PHOTOGRAPHER/ STILL	PT. MUGU	POV TO BASE/ PRESS AM	N/A	AMES HELIO
WYNNE, T.	PHOTO/RESCUE TEAM	JPL	7246 TO FIRE STATION	N/A	FIRE TRUCK

APPENDIX U

CID STATION/CAMERA LIST

C.I.D.
720 TRANSPORT
CONTROLLED IMPACT DEMONSTRATION

CATALOG

FILM/TAPE/STILLS

CID STATION/CAMERA LIST

STATION #/ CAMERA #	LENS MM	FRAMES PER SECOND	DESCRIPTION OF COVERAGE
1-1	50	48	STRAIGHT UP RUNWAY, A/C ENTERS OVERHEAD.
2-1	50	400	COLL. FENCE AND RHINOS, FROM BEHIND.
2-2	16	400	REMOTE-A/C FIRST IMPACT WITH GROUND.
3-1	16	400	REMOTE-L.S. FENCE AND RHINOS, A/C ON GROUND.
3-2	75	400	E.C.U. FENCE AND RHINOS.
3-3	80	1,000	E.C.U. RHINOS, SLIGHTLY BEHIND LOOKING FORWARD.
4-1	16	400	REMOTE-L.S. FROM RHINOS FORWARD.
4-2	25	400	M.S. FENCE & RHINOS.
4-3	80	1,000	E.C.U.-FENCE & RHINOS, SLIGHTLY AHEAD LOOKING BACK.
4-4	8	15	M.S FENCE & RHINOS (70MM STILL: ROLL D).
5-1	16	400	REMOTE-L.S. A/C SLIDES THROUGH FRAME.
5-2	50	400	M.C.U.-FENCE & RHINOS - AHEAD LOOKING BACK.
5-3	50	4	(35MM STILL: ROLL 1)
5-4	80	1.5	(220 PAO HASSELBLAD)
6-1	15	400	REMOTE-L.S. A/C SLIDES TO STOP, FOR LEFT OF FRAME.
6-2	100	400	C.U. A/C SLIDES THROUGH FRAME.
7-1	16	400	REMOTE-L.S. ENGINE AND TIRES ROLL THROUGH FRAME, NO A/C.
8-1	15	400	REMOTE-L.S. NO ENTRY OF A/C.
9-1	15	400	REMOTE-L.S. NO ENTRY OF A/C.
10-1	10	400	L.S. ANGLE DOWN RUNWAY TOWARD RHINOS, VERY WIDE; ACTION ON FAR RIGHT OF FRAME, SUN FLAIR LEFT HALF.
10-2	10	400	REMOTE L.S. NO ENTRY OF A/C.
11-1	100	400	C.U. STRAIGHT DOWN RUNWAY, A/C COMES DIRECTLY TOWARD CAMERA
11-2	50	400	L.S. SAME ANGLE AS 11-1 BUT MORE RIGHT OF CENTER.
11-3	75	48	M.S. SAME ANGLE AS 11-2 BUT LARGER IMAGE.
11-4	500	1.5	C.U. HASSELBLAD (ROLL #106).
11-E	20"	15	C.U. HULCHER (ROLL E).
11-I	8"	10	M.S. 70MM (ROLL I).
11-VID	ZOOM	60	M.S. NORMAL VIDEO + AUDIO (NORELCO 3/4").
11-VID	100	60	M.S. HIGH SPEED VIDEO 1/10,000 EXP. (PCSC 1000).
12-1	10	400	REMOTE NOT ENTRY BY A/C.
12-2	10	400	WIDE ANGLE LOOKING DOWN RUNWAY TO RHINOS - A/C STOPS IN MIDDLE OF FRAME.
13-1	12	400	REMOTE NO A/C ENTRY.
14-1	15	400	REMOTE NO A/C ENTRY.

C.I.D. STATION CAMERA LIST

STATION #/ CAMERA #	LENS MM	FRAMES PER SECOND	DESCRIPTION OF COVERAGE
14-VID 1	100	60	HIGH SPEED VIDEO, 1/10,000 EXP. (PCSC-1000) 1/2".
14-VID 2	100	60	HIGH SPEED VIDEO, 1/10,000 EXP. (PCSC-1000) 1/2".
15-1	16	400	REMOTE-A/C JUST ENTERS FOR LEFT FRAME.
15-2	16	400	L.S.-FULL VIEW, A/C FROM FENCE TO SLIDE TO STOP.
15-VID	75	60	HIGH SPEED VIDEO, 1/10,000 EXP. (PCSC-1000 JPL) 1/2"
16-1	100	400	C.U. A/C SLIDES THROUGH FRAME.
16-2	16	400	REMOTE-GOOD OVERALL VIEW FROM SLIDE TO STOP.
16-3	200	15	70MM HULCHER (STILL) C.U. ROLL (G).
16-VID	100	60	HIGH SPEEC VIDEO, 1/10,000 EXP. (PCSC 2000) 3/4"
18-1	15	400	REMOTE FROM FENCE A/C SLIDES THROUGH FRAME W/RIGHT WING UP.
18-2	25	400	M.S. A/C SLIDES THROUGH FRAME.
18-3	105	1,000	E.C.U. RHINOX AND FENCE.
18-4	150	15	70MM HULCHER (STILL) C.U. (ROLL C)
19-1	16	400	REMOTE - N.G. OUT OF FOCUS.
19-2	75	400	C.U. FENCE AND RHINO.
19-3	80	1,000	E.C.U. RHINOS.
19-4	50	4	M.S. FENCE AND RHINOS (35MM - STILL).
19-5	150	15	M.S. FENCE AND RHINOS (70MM HULCHER - STILL).
20-1	50	400	M.S. FENCE AND RHINOS.
20-2	16	400	REMOTE - A/C TOUCHING DOWN (IMPACT).
21-1	9"	180	M.S. FENCE AND RHINOS.
21-VID-1	75	2,000	SPIN PHYSICS - SPLIT IMAGE HIGH SPEED VIDEO.
21-VID-2	100	2,000	SPIN PHYSICS - SPLIT IMAGE HIGH SPEED VIDEO.
21-IR	20	60	HORNDAY I.R. (NO COVERAGE, TILL FIRE FIGHTING).
STATION #22:			STATION 22 WAS A REMOTELY OPERATED TRACKING MOUNT; THE IMAGE THAT FOLLOW ARE THEREFORE ALL BASICALLY THE SAME: THEY VARY ONLY IN TYPE OF CAMERA, LENS, FRAME RATE, AND MEDIUM.
22-1	24	180	C.U. TRACKING A/C FROM APPROACH THROUGH IMPACT, SLIDEOOUT, STOP AND FIREFIGHTING AT WREAKAGE.
22-2	10"	180	M.S. FULL VIEW OF A/C.
22-3	4"	64	L.S. A/C FRAMED ON RIGHT TO ALLOW SPACE FOR ANY TRAILING FLAMES AND SMOKE.
22-4	2"	400	SAME AS 22-3 BUT MUCH SLOWER.
22-5	6"	64	L.S. OF 22-2.
22-6	6"	400	L.S. OF 22-2.
22-7	10"	64	L.S. OF 22-2.
22-8	6"	24	L.S. OF 22-2.
22-9	6"	60	INFRARED (INFRAMETRICS), 1/2".
22-10	8"	15	HULCHEN 70MM (STILLS).
22-VID-1	40	60	HIGH SPEED VIDEO (PCSC- 2000 JPL) 3/4".

C.I.D. STATION CAMERA LIST

LANGLEY ON-BOARD CAMERAS:

ALTHOUGH NOT A DIRECT RESPONSIBILITY OF THE PHOTO DIRECTOR BUT A PART OF THE FAA FILM ON FILE, THESE CAMERAS COVERED THE ACTION THAT TOOK PLACE INSIDE THE A/C, SPECIFICALLY, THE EFFECT THE TEST HAD ON THE MANNEQUIN PASSENGERS.

STATION/CAMERA#	MAKE	MM	FPS	FILM	FOOTAGE
1-1C1	MILLIKEN	10	400	7250	400'
2-1C2	MILLIKEN	10	400	7250	400'
3-1C3	MILLIKEN	10	400	7250	400'
4-2C1	MILLIKEN	10	400	7250	400'
5-2C2	MILLIKEN	10	400	7250	400'
6-2C3	MILLIKEN	10	400	7250	400'
7-3C1	MILLIKEN	10	400	7250	400'
8-3C2	MILLIKEN	10	400	7250	400'
9-4C1	MILLIKEN	10	400	7250	400'
0-4C2	MILLIKEN	10	400	7250	400'

STATION C7

STATION #/ CAMERA #	LENS MM	FRAMES PER SECOND	DESCRIPTION OF COVERAGE
C7-1	1,000	400	16MM LOCAM - HAND TRACK ON APPROACH, IMPACT, SLIDE OUT TO STOP.
C7-2	800	VARIABLE	35MM STILL COVERAGE AT IMPACT.

HELICOPTERS

STATION #/ CAMERA #	LENS MM	FRAMES PER SECOND	DESCRIPTION OF COVERAGE
EAST-1	80	10	70MM (STILL) AERIAL COVERAGE OF TEST.
EAST-2	80	VARIABLE	HASSELBLAD, STILL PHOTOGRAPHY.
EAST-3	12-120	48	GENERAL AERIAL COVERAGE OF TEST AND POST TEST ACTION.
EAST-4	25	400	GENERAL HIGH SPEED AERIAL COVERAGE.
WEST-1	80	10	70MM (STILL) AERIAL COVERAGE OF TEST.
WEST-2	80	VARIABLE	HASSELBLAD, STILL PHOTOGRAPHY.
WEST-3	12-120	48	GENERAL AERIAL COVERAGE OF TEST AND POST TEST ACTION.
WEST-4	25	400	GENERAL HIGH SPEED AERIAL COVERAGE.

CHASE PLANE

STATION #/ CAMERA #	LENS MM	FRAMES PER SECOND	DESCRIPTION OF COVERAGE
1	50-300	VARIABLE	35MM STILL COVERAGE OF A/C IN FLIGHT, IMPACT, AND POST IMPACT ACTION.

C.I.D. STATION CAMERA LIST

CHASE PLANE

STATION #/ CAMERA #	LENS MM	FRAMES PER SECOND	DESCRIPTION OF COVERAGE
1	50-300	VARIABLE	35MM STILL COVERAGE OF A/C IN FLIGHT, IMPACT, AND POST IMPACT ACTION.

CAST GLANCE

STATION #/ CAMERA #	LENS MM	FRAMES PER SECOND	DESCRIPTION OF COVERAGE
A/C-1	60"	100	C.U. IMPACT, SLIDE-OUT AND FIRE FIGHTING. CAMERA STOPS AND RESTARTS SEVERAL TIMES AFTER A/C HAS COME TO A FULL STOP. ALL OF THE CAST-GLANCE CAMERAS ARE STOPPED AND RESTARTED AT NEW LOCATIONS AND ANGLES.
A/C-2	40"	100	35MM IMAGE ON IT'S SIDE; FOR STILL FRAME ONLY.
A/C-3	40"	128	SAME AS CG-1
A/C-4	12"	48	A/C AND CHASE PLANE, THEN L.S. IMPACT, THEN FIRE FIGHTING.
A/C-5	12"	48	L.S. FIREFIGHTING ONLY.
A/C-6	40"	50	C.U. FIREFIGHTING.
VID-1	28"	60	3/4" COLOR.
VID-2	40"	60	3/4" RED FILTER B&W NEAR IR.
VID-3	60"	60	3/4" COLOR.

DOCUMENTARY CAMERAS
16MM MOTION PICTURE

CAMERA PERSON	CAMERA	DESCRIPTION OF COVERAGE
DAWSON:	ARRI SR W/ZOOM ACTIONMASTER 500 W/ZOOM	COVERAGE INCLUDED PREPARATION OF A/C, FUEL MIXING AND LOADING, MORNING PREFLIGHT, TAKE-OFF, IMPACT, FIREFIGHTING, AND PHOTOGRAPHERS AT WORK.
ROWE:	ARRI S-W W/ZOOM ARRI S-W W/10MM	COVERAGE OF REMOTE PILOT STATION.
MAUGHAN:	ARRI S-W/ZOOM	COVERAGE OF FIRE FIGHTERS AND POST IMPACT WREAKAGE.

C.I.D. STATION CAMERA LIST

DOCUMENTARY CAMERAS
3/4" VIDEO

CAMERA PERSON	CAMERA	DESCRIPTION OF COVERAGE
BORSCHT:	SHARP XC700 W/14-1 ZOOM	GENERAL COVERAGE OF FIREFIGHTERS.
HANCHETT:	JVC 4400 RECORDER	IN ACTION, PICTURE, AND AUDIO.

DOCUMENTARY CAMERAS
(35MM AND 2 1/4" STILL CAMERAS)

CAMERA PERSON	LENS MM	FRAMES PER SECOND	DESCRIPTION OF COVERAGE	STATION
PATTERSON	50	VARIABLE	PUBLICITY PHOTOS OF EVENT. (NIKON)	
LACHATA	50	VARIABLE	PUBLICITY PHOTOS OF EVENT. (NIKON)	
	80	"	PUBLICITY PHOTOS OF EVENT. (HASSELBLAD)	
WYNNE	38	VARIABLE	CLOSE UP, PHOTOJOURNALISTIC COVERAGE OF FIREFIGHTERS	
	50	"	IN ACTION.	
	80	"	(SUPER WIDE HASSELBLAD, HASSELBLAD 500CM.)	

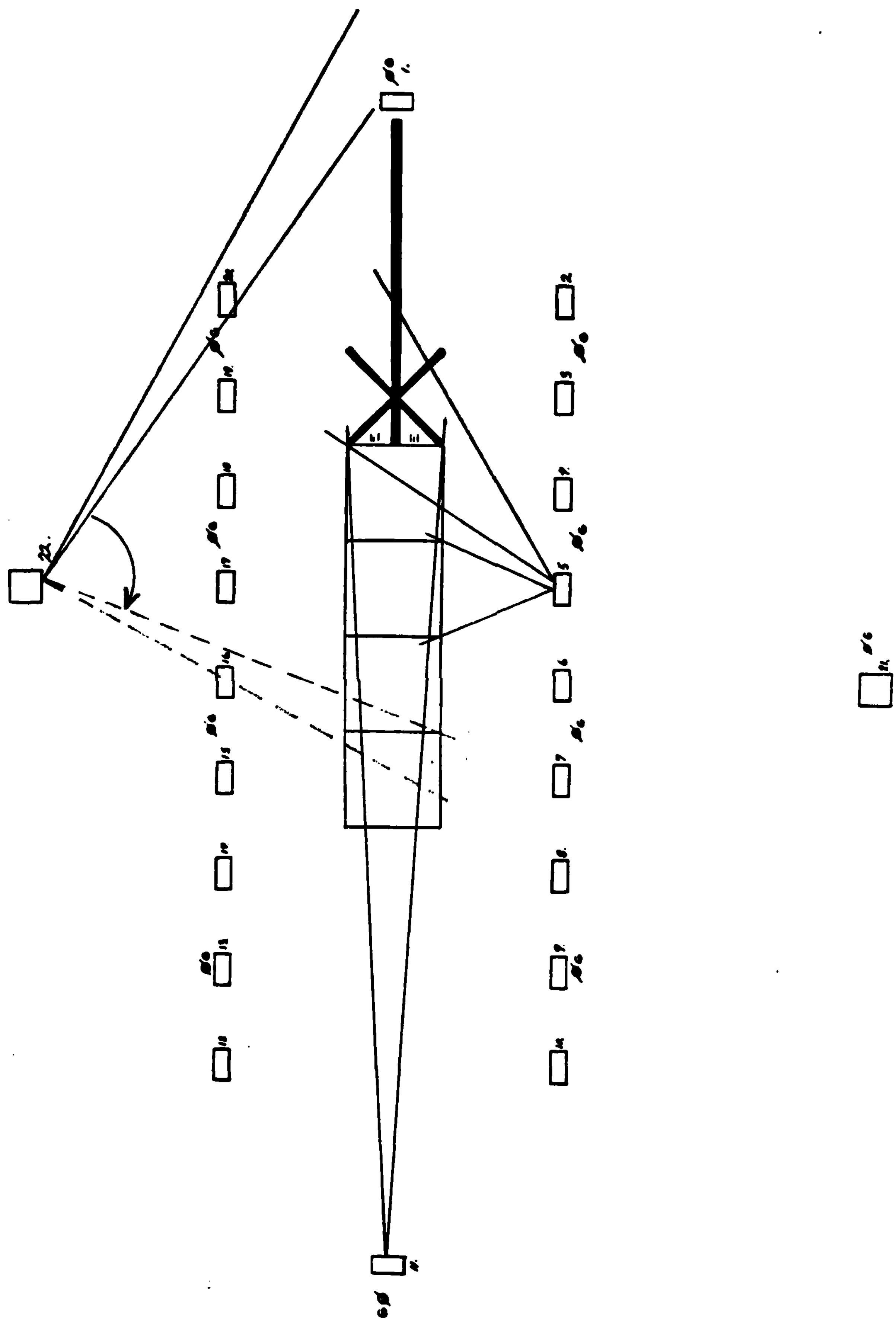
VIDEO DUPING AREA

3/4" AND 1/2" VIDEO TAPES WERE BROUGHT TO A TRAILER WHICH WAS SETUP AS A VIDEO DUPING AREA FOR ALL VIDEO TAPES USED TO RECORD THE EVENT. DUPES WERE MADE AVAILABLE TO FAA WHO EDITED A PRESS RELEASE FOR DISTRIBUTION.

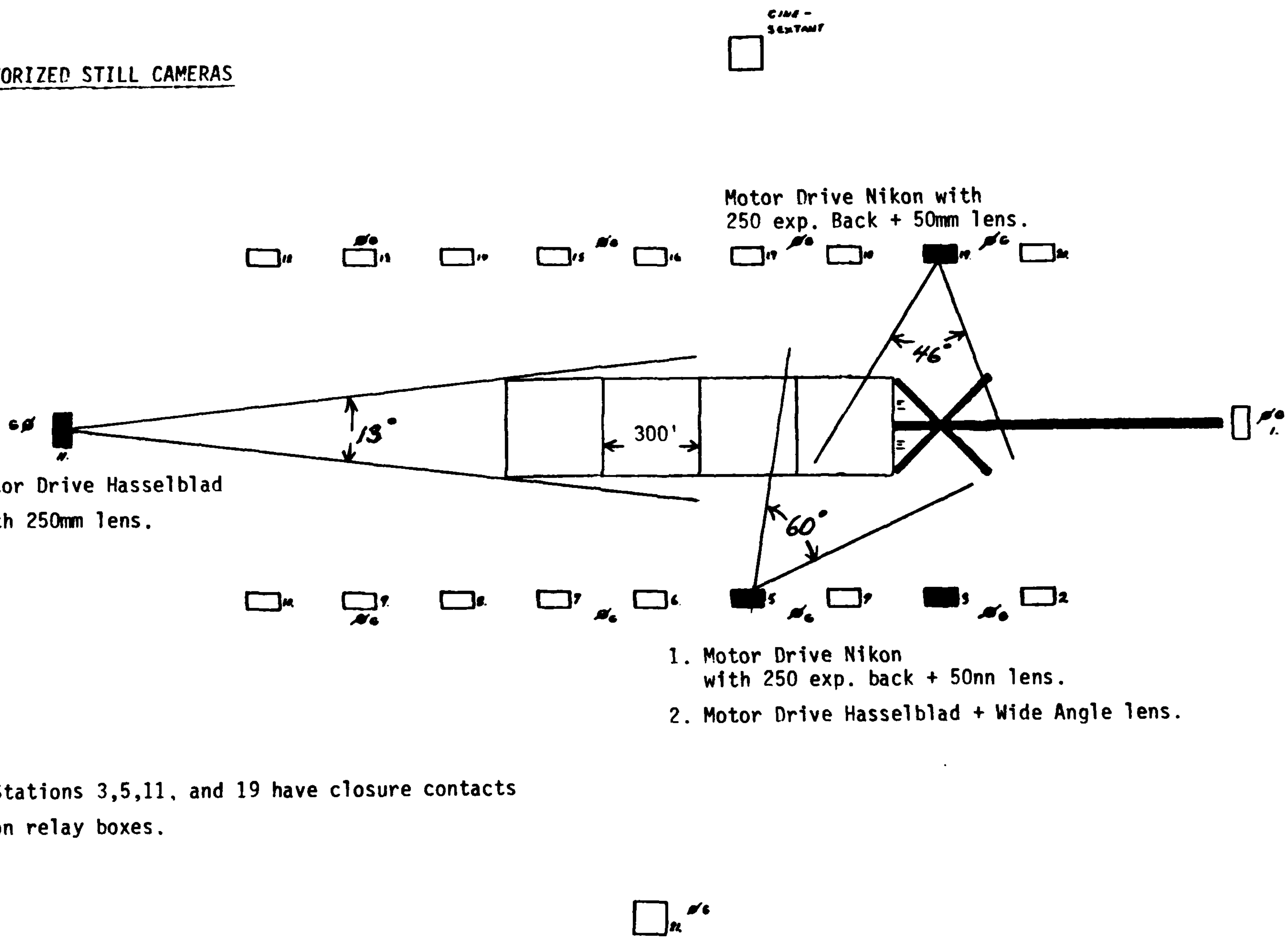
CAMERAS

16MM HIGH SPEED MOTION PICTURE CAMERAS = 70
35MM HIGH SPEED MOTION PICTURE CAMERAS = 7
16MM DOCUMENTARY MOTION PICTURE CAMERAS = 6
HIGH SPEED VIDEO CAMERAS = 12
DOCUMENTARY VIDEO CAMERAS = 6
TRACKING MOUNTS = 2
INFRARED (VIDEO) CAMERAS = 2
STILL CAMERAS: 35MM = 6, 2 1/4" = 7, 70MM = 13

PORTABLE GENERATORS = 12
IRIG TIMING TRANSMITTED AND RECEIVED AT ALL 24 STATIONS (17/22 & C7).

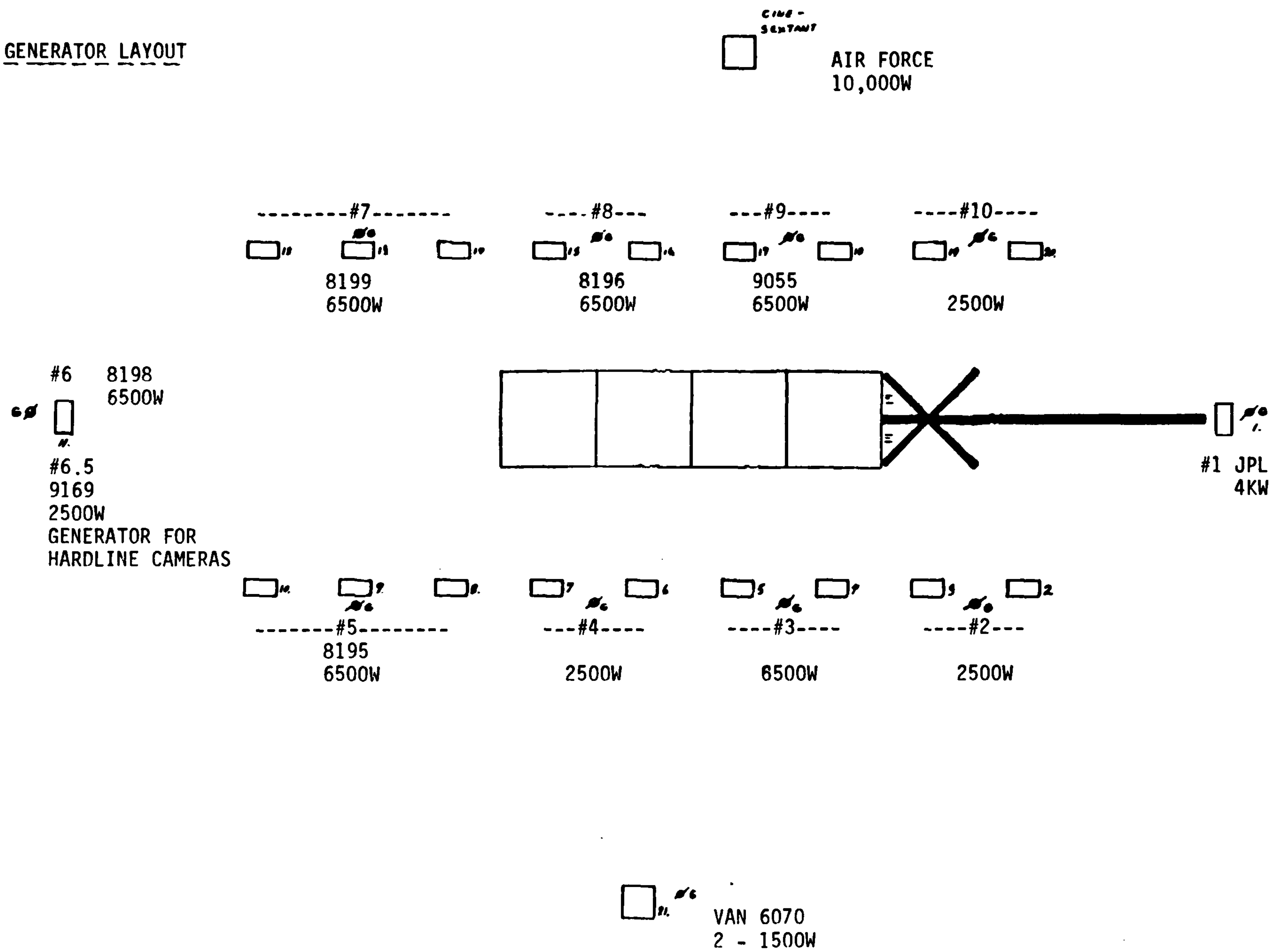


MOTORIZED STILL CAMERAS



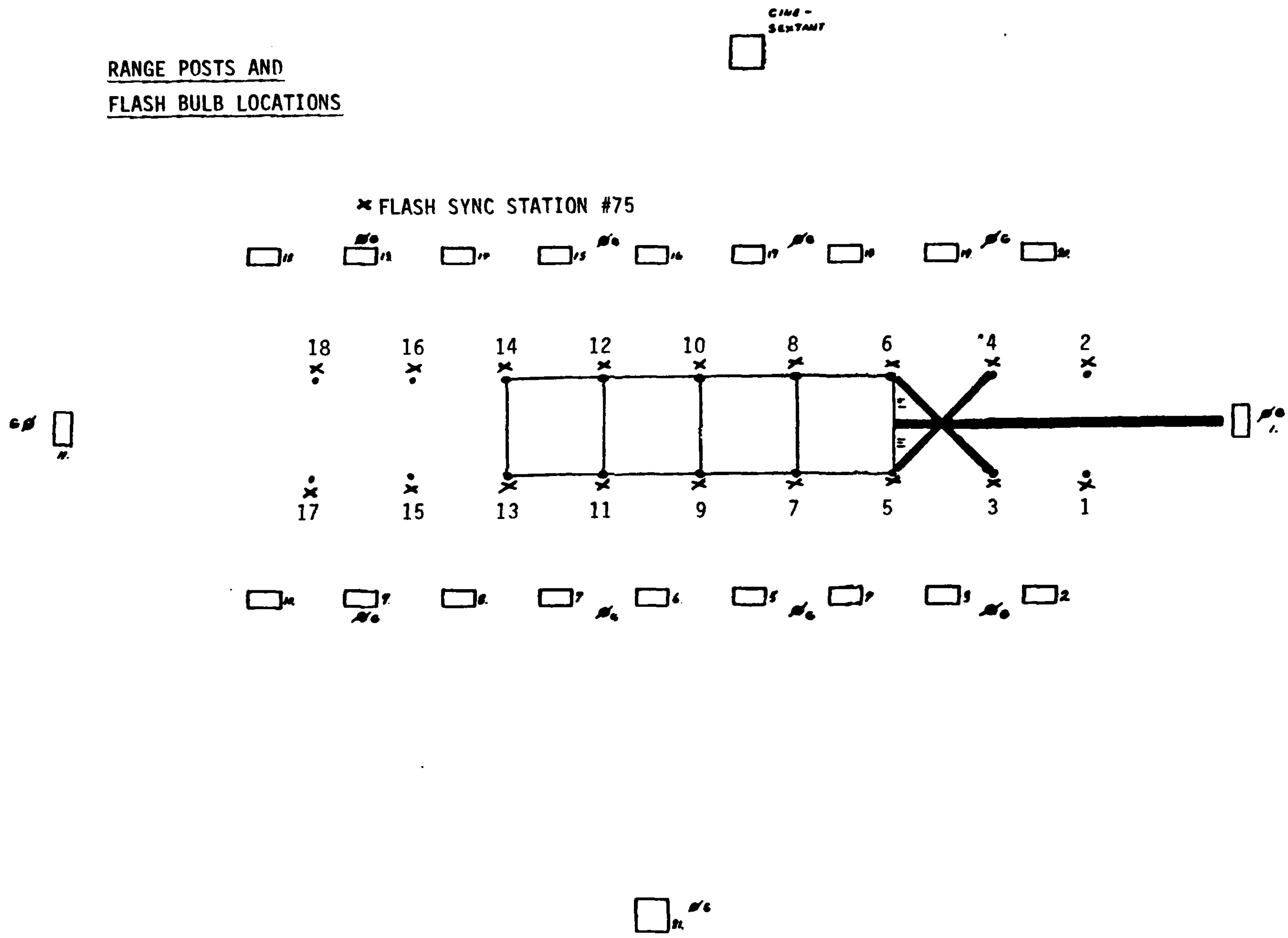
* Stations 3,5,11, and 19 have closure contacts
on relay boxes.

GENERATOR LAYOUT



RANGE POSTS AND

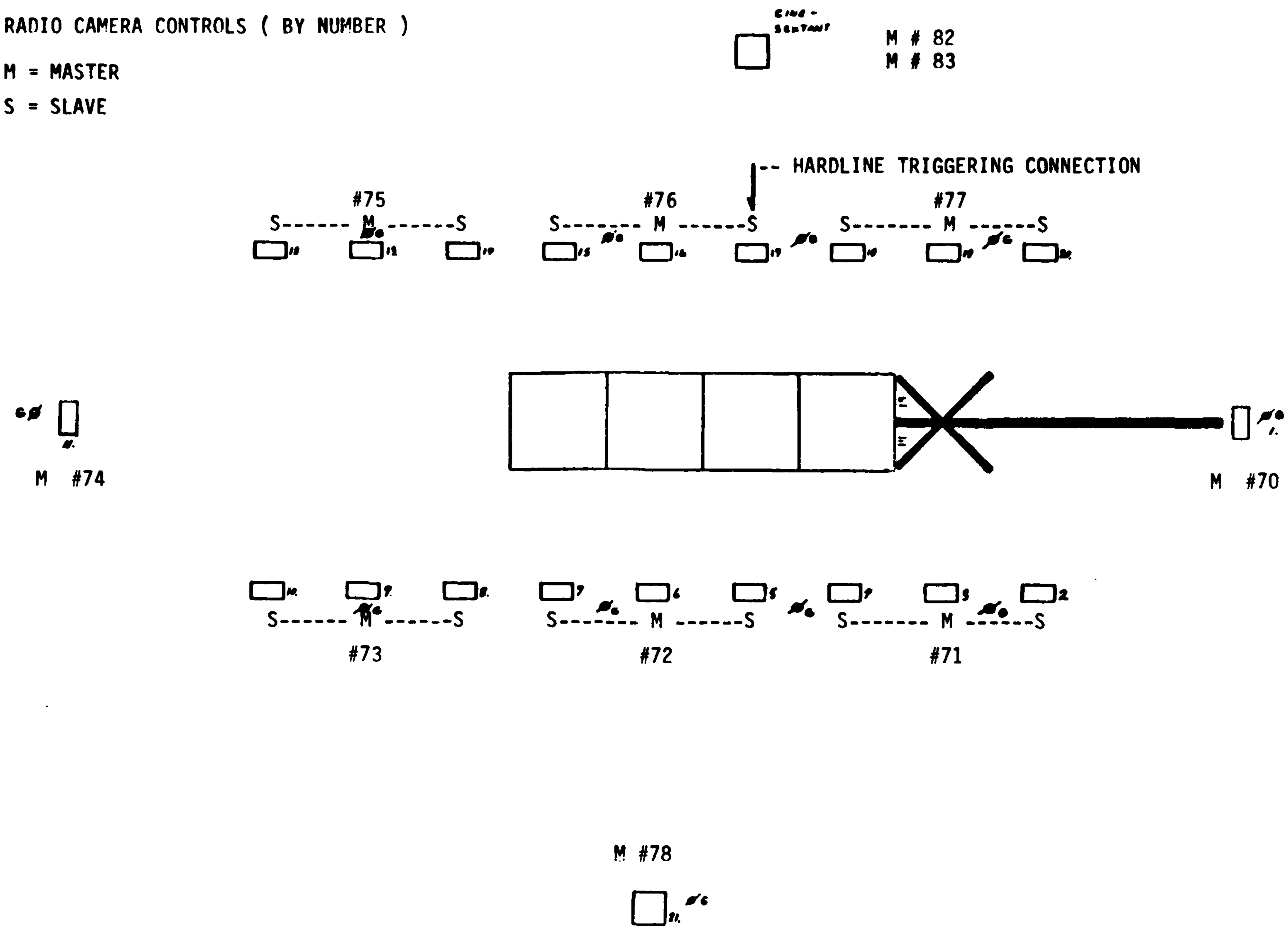
FLASH BULB LOCATIONS



RADIO CAMERA CONTROLS (BY NUMBER)

M = MASTER

S = SLAVE



C.I.D.

720 TRANSPORT
CONTROLLED IMPACT DEMONSTRATION

CATALOG

FILM/TAPE/STILLS

JET PROPULSION LABORATORY

JOHN D. GREGOIRE
4800 OAK GROVE DRIVE M/S 111-115
PASADENA, CALIFORNIA 91109
(818) 354-5100

CONTROLLED IMPACT DEMONSTRATION

FILM TO INTERNEG AND POSITIVE

FAA	STATION #/ CAMERA #	CAMERA MAKE	MM	FPS	FILM	FOOTAGE
30'	1-1	L-PL	50	48	7291	400
36'	2-1	MILLIKEN	50	400	7294	400
36'	2-2	"	16	400	7294	400
50'	3-1	MILLIKEN	16	400	7294	400
46'	3-2	"	75	400	7294	400
50'	3-3	PHOTEC	80	1,000	7239	400 POSITIVE
36'	4-1	MILLIKEN	16	400	7294	400
24'	4-2	"	25	400	7294	400
46'	4-3	PHOTEC	80	1,000	7239	400 POSITIVE
50'	5-1	MILLIKEN	16	400	7294	400
40'	5-2	"	50	400	7294	400
70'	6-1	MILLIKEN	15	400	7294	400
36'	6-2	"	100	400	7294	400
56'	7-1	MILLIKEN	16	400	7294	400
0'	8-1	MILLIKEN NO ENTRY OF A/C	15	400	7294	400
0'	9-1	MILLIKEN NO ENTRY OF A/C	15	400	7294	400
40'	10-1	MILLIKEN	10	400	7294	400
0'	10-2	" NO ENTRY OF A/C	10	400	7294	400
118'	11-1	MILLIKEN	100	400	7294	400
67'	11-2	"	50	400	7294	400
36'	11-3	L-PL	75	48	7291	400
0'	12-1	MILLIKEN SUPER WIDE NO ENTRY	10	400	7294	400
60'	12-2	"	10	400	7294	400
0'	13-1	MILLIKEN	12	400	7294	400
0'	14-1	MILLIKEN	15	400	7294	400
36'	15-1	MILLIKEN	16	400	7294	400
85'	15-2	"	16	400	7294	400
36'	16-1	MILLIKEN	100	400	7294	400
60'	16-2	"	16	400	7294	400

CONTROLLED IMPACT DEMONSTRATION

FILM TO INTERNEG AND POSITIVE

FAA	STATION #/ CAMERA #	CAMERA MAKE	MM	FPS	FILM	FOOTAGE	
36	17 1		16	400	7294	400	
36'	17 2	"	15	400	7294	400	
55'	18 1	MILLIKEN	15	400	7294	400	
30	18 2		25	400	7294	400	
46'	18 3	PHOTEC	105	1 000	7239	400	POSITIVE
0'	19 1	MILLIKEN	16	400	7294	400	
24'	19 2		75	400	7294	400	
36'	19 3	PHOTEC	80	1 000	7239	400	POSITIVE
20'	20-1	MILLIKEN	50	400	7294	400	
21'	20 2		16	400	7294	400	
50'	21 1	4 ML	9"	180	5294	1 000	
150'	22 1	4 ML	24"	180	5294	1 000	
350'	22 2	"	10"	180	5294	1 000	
120'	22 3		4"	64	5294	1 000	
100'	22 4	1 PL	2"	400	7294	400	
55	22 5		6"	64	7294	400	
120'	22 6	"	6"	400	7294	400	
100	22 7		10"	64	7294	400	
55'	22 8		6	24	7291	400	
100'	17/22 1	4 ML	32"	180	5294	1 000	
125	17/22 2		100"	180	5294	1 000	
50'	17/22 3	1 ML	24"	24	7294	400	
100	17/22 4		15"	400	7294	400	
0'	17/22 5	"	60"	64	7294	400	
0	17/22 6		24"	24	7291	400	
0'	17/22 7	"	15	24	7291	400	
	11 3		75	48	7291	400	
100'	ONBOARD/CABIN	1 PL	10	200	7291	200	
84'	ONBOARD/NOSE	1 PL	10	100	7291	400	
105'	ONBOARD/TAIL	1 PL	5 7	200	7291	100	
	GLANCE P 3						
150'	A/C 1	1 PL	60"	100	7251	400	POSITIVE
100	A/C 2	4 ML	40"	100	5294	1 000	POSITIVE
100'	A/C 3	1 PL	40"	128	7251	400	POSITIVE
0	A/C 4	1 UN	12"	48	2239	200	POSITIVE
0'	A/C 5	1 UN	12"	48	2239	200	POSITIVE
50'	A/C 6	1 PL	40"	50	7239	400	POSITIVE
	HELICOPTER		AMES + ARMY				POSITIVE

CONTROLLED IMPACT DEMONSTRATION
FILM TO TAPE

TAPE 1

STATION #/ CAMERA #	CAMERA MAKE	MM	FPS	FILM	FOOTAGE
1-1	MILLIKEN	50	48	7291	400
2-1	MILLIKEN	50	400	7294	400
2-2	"	16	400	7294	400
3-1	MILLIKEN	16	400	7294	400
3-2	"	75	400	7294	400
3-3	PHOTEC	80	1,000	7239	400
4-1	MILLIKEN	16	400	7294	400
4-2	"	25	400	7294	400
4-3	PHOTEC	80	1,000	7239	400
5-1	MILLIKEN	16	400	7294	400
5-2	"	50	400	7294	400
6-1	MILLIKEN	15	400	7294	400
6-2	"	100	400	7294	400
7-1	MILLIKEN	16	400	7294	400
8-1	MILLIKEN	15	400	7294	400
	NO ENTRY OF A/C				
9-1	MILLIKEN	15	400	7294	400
	NO ENTRY OF A/C				
10-1	MILLIKEN	10	400	7294	400
10-2	"	10	400	7294	400
	NO ENTRY OF A/C				
11-1	MILLIKEN	100	400	7294	400
11-2	"	50	400	7294	400

CONTROLLED IMPACT DEMONSTRATION
FILM TO TAPE

TAPE 2

STATION #/ CAMERA #	CAMERA MAKE	MM	FPS	FILM	FOOTAGE
11 3		75	48	7291	400
12 1	MILLIKEN NO ENTRY OF A/C	10	400	7294	400
12 2		10	400	7294	400
13 1	MILLIKEN	12	400	7294	400
14 1	MILLIKEN	15	400	7294	400
15 1	MILLIKEN	16	400	7294	400
15 2	"	16	400	7294	400
16 1	MILLIKEN	100	400	7294	400
16 2		16	400	7294	400
17 1		16	400	7294	400
17 2		15	400	7294	400
18 1	MILLIKEN	15	400	7294	400
18 2		25	400	7294	400
18-3	PHOTEC	105	1 000	7239	400
19 1	MILLIKEN	16	400	7294	400
19 2		75	400	7294	400
19 3	PHOTEC	80	1 000	7239	400
20-1	MILLIKEN	50	400	7294	400
20 2	"	16	400	7294	400
21 1	4 ML	9	180	5294	1 000

CONTROLLED IMPACT DEMONSTRATION
FILM TO TAPE

TAPE 3

STATION #/ CAMERA #	CAMERA MAKE	MM	FPS	FILM	FOOTAGE
22 1	4 ML	24"	180	5294	1 000
22 2		10"	180	5294	1 000
22 3		4"	64	5294	1 000
22 4	1 PL	2"	400	7294	400
22 5		6"	64	7294	400
22 6		6"	400	7294	400
22 7		10"	64	7294	400
22 8		6"	24	7291	400
17/22 1	4 ML	32"	180	5294	1 000
17/22 2		100"	180	5294	1 000
17/22 3	1 ML	24"	24	7294	400
17/22 4		15"	400	7294	400

CONTROLLED IMPACT DEMONSTRATION
TAPE TO TAPE

TAPE 1 OF 4

LOCATION	TAPE #	SPECIAL NOTES FOOTAGE
FIRE TRUCK	1	FIRE STATION TO CRASH
FIRE TRUCK	2	FIRE FIGHTING
FIRE TRUCK	3	FIRE FIGHTING (CONTINUED)

TAPE 2 OF 4

FIRE TRUCK	4	FIRE FIGHTING (CONTINUED)
FIRE TRUCK	5	FIRE FIGHTING AND INTERIORS
FIRE TRUCK	6	POST CRASH LONG SHOTS

TAPE 3 OF 4

NORELCO STATION 17/22		SECOND EVACUATION AUDIO & CRASH
NORELCO STATION 11		CRASH (BAD AUDIO)
PCSC 1000 NAGY 1/2		CRASH ONLY (1/2 MASTER)
PCSC 6500 NAGY STATION 17		CRASH ONLY (GOOD AUDIO)
PCSC 1000 NAGY STATION 11		CRASH ONLY
PCSC 2000 NAGY STATION 16		CRASH ONLY
XYBION STATION 17/22		TAKEOFF TO CRASH (TRACKING)
XYBION STATION 17/22		1/2 MASTER HIGH SPEED (STATIONARY)
STATION 22 REMOTE TRITRONICS		TAKEOFF TO CRASH (BLUE EXPOSURE)
SPIN PHYSICS STATION 21		WEATHERFORD FPS 2000/SPLIT SCREEN
INFRAMETRICS IR STATION 22		1/2" MASTER (BAD GLITCHES) REGULAR & STEPPED
FLAR IR STATION 21		HORNADY (1/2 MASTER)
INFRAMETRICS IR STATION 22		1/2" MASTER BACKUP TAPE (GOOD QUALITY) (REGULAR & STEPPED)

TAPE 4 OF 4

CAST GLANCE	1	AFT MOUNT (SHAKY) AUDIO
CAST GLANCE	2	FRONT MOUNT NEAR IR AUDIO
CAST GLANCE	3	FRONT MOUNT 28 COLOR

CONTROLLED IMPACT DEMONSTRATION
FILM TO TAPE

TAPE 4

STATION #/ CAMERA #	CAMERA MAKE	MM	FPS	FILM	FOOTAGE
22-5	"	6"	64	7294	400
22-6	"	6"	400	7294	400
22-7	"	10"	64	7294	400
22-8	"	6"	24	7291	400
17/22-1	4 ML	32"	180	5294	1,000
17/22-2	"	100"	180	5294	1,000
17/22-3	1 ML	24"	24	7294	400
17/22-4	"	15"	400	7294	400
17/22-5	"	60"	64	7294	400
17/22-6	"	24"	24	7291	400
17/22-7	"	15"	24	7291	400
ONBOARD/CABIN	1 PL	10	200	7291	200
ONBOARD/NOSE	1 PL	10	100	7291	400
ONBOARD/TAIL	1 PL	5.7	200	7291	100
CAST/GLANCE P-3:					
A/C-1	1 PL	60"	100	7251	400
A/C-2	4 ML	40"	100	5294	1,000
A/C-3	1 PL	40"	128	7251	400
A/C-4	1 UN	12"	48	2239	200
A/C-5	1 UN	12"	48	2239	200
A/C-6	1 PL	40"	50	7239	400

CONTROLLED IMPACT DEMONSTRATION

STILLS
FILM TYPE VPS FILM SIZE. 70MM

STATION	CAMERA	JPL ROLL ID #	PHOTOG.	CAMERA TYPE	FPS	LENS FOCAL LENGTH	COVERAGE	FRAMES PRINTED
NASA HELO 734	004	A	B. RICHARDS	PHOTO-SONIC 14-S	10	200MM	AERIAL	1-38, 43, 48, 53, 58. 63. 111.
ARMY HELO 331	005	B	G WINEY	PHOTO-SONIC 14-S	10	200MM	AERIAL	1, 5-48, 53 58, 121, 125. 130, 135, 159.
18	003	C	REMOTE	HULCHER	15	6"	GROUND	1-14
4	004	D	REMOTE	HULCHER	15	8"	GROUND	1-9
11	005	E	REMOTE	HULCHER	15	20"	GROUND	1 6 11. 16 21, 26. 31, 36-75. 87
19	002	F	REMOTE	HULCHER	15	6"	GROUND	1-13
16	003	G	REMOTE	HULCHER	15	8"	GROUND	1, 5-15, 19.
STATION 22	CINE SEXTANT	H	REMOTE	HULCHER	15	8"	TRACKER	1-38 69 75, 81, 87, 93, 99, 137.
11	0-03	I	REMOTE	HULCHER	10	210MM	GROUND HEAD ON	1, 4, 6, 9, 11, 16, 21 26 28-39. 44, 49, 54. 59. 64, 69, 74. 79 84. 89.

CONTROLLED IMPACT DEMONSTRATION

STILLS

12/01/84 - CRASH & BURN SEQUENCE

ROLL I D 3	FRAMES
TW-R100	2
TW-R101	69
TW-102	65
TW-103	51
TW-104	69
TW-105	53

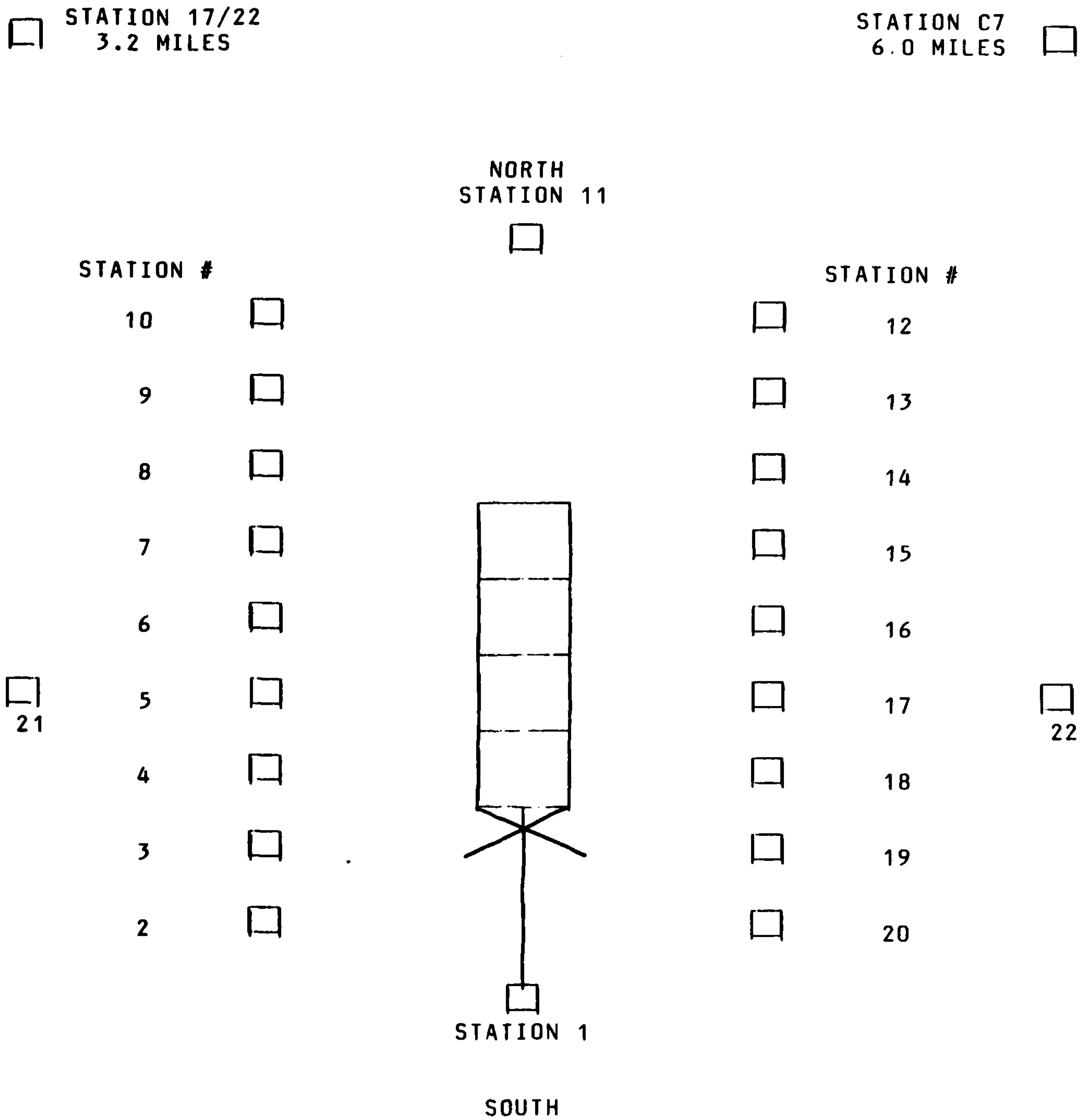
12/01/84 - NASA HELO HAND HELD STILLS

ROLL I D. 3	FRAMES
J	10
K	10
L	12

12/04/84 - POST CRASH DOCUMENTATION

ROLL I D 3	FRAMES
TW-R107	68
TW-R108	18
TW-R109	62
TW-R110	60
TW-R111	11
TW-R112	11

CONTROLLED IMPACT DEMONSTRATION SITE



APPENDIX V

PARTICIPATING PERSONNEL/ORGANIZATION
DECEMBER 1, 1984
CONTROLLED IMPACT DEMONSTRATION DAY

PARTICIPATING PERSONNEL/ORGANIZATION
DECEMBER 1, 1984
CONTROLLED IMPACT DEMONSTRATION DAY

B #	LAST NAME	FIRST NAME	ORGANIZATION	LAKEBED FUNCTION/TASK	DAYS REQ
000	AA 29 NOV		AA 29 NOV		
N/A	EDMONSON	JAMES, SMSGT	AFFTC	SECURITY	
013	SAXER	C., LT. COL.	AFFTC	ON-SCENE COMMANDER	1 (IDO)
069	WIDMAYER	E.	BOEING	CW EXP. DOCUMENTATION	1T3
152	YANDELL	CALVIN	CAL. INDUS.	SALVAGE CONTRACTOR	1 & 30
338	CROSSFIELD	SCOTT	CONGRESS	VIP	1 (IDO)
014	SHIPMAN	BILL	DAHLGREN		1T3
183	SANDERS	FRANK	F. S. ACFT.	SERVICING TAIL CONE	1 (IDO)
174	SEEVERS	JOHN	F. S. ACFT.	SERVICING TAIL CONE	1 (IDO)
120	BELL	K.	FAA	SAFING TEAM/BACKUP	
335	BLAKE	NIEL	FAA	VIP	1 (IDO)
131	CAIAFA	CAESAR	FAA	DOC. RESEARCH TEAM	1T3/9T10
336	CASTLEBURY	GARLAND	FAA	VIP	1 (IDO)
145	CHANDLER	DICK	FAA	DOC. RESEARCH TEAM	1T3/9T10
004	CHESTERFIELD	BURT	FAA	SYSTEMS CHAIRMAN	3T30
072	CRANE	CHARLES	FAA	INVESTIGATOR	3T8
076	CRANE	MARLENE	FAA	INVESTIGATOR	3T8
080	DEL GANDIO	FRANK	FAA	ABF-100 INVESTIGATOR	1T30
029	EASTON	LOCKE	FAA	POWERPLANT CHAIRMAN	2T8
340	ENGEN	DONALD	FAA	VIP - ADMINISTRATOR	1 (IDO)
012	FENTON	BRUCE	FAA	DOC. RESEARCH TEAM	
337	FROMME	BILL	FAA	VIP	1 (IDO)
226	GARDLIND	JEFF	FAA	INVESTIGATOR	3T8
028	GARODZ	LEO	FAA	PROJECT MANAGER	1T30
173	HALL	DAVE	FAA	INVESTIGATOR	3T8
083	HANLON	JACK	FAA	MOTION PICTURE	1T3/9T10
086	HILL	RICHARD	FAA	INVESTIGATOR	1T8
090	JOHNSON	R.	FAA	DOC. RESEARCH TEAM	1T3/9T10
175	LA FEVER	LYNN	FAA	INVESTIGATOR	3T8
023	LIUM	GARY	FAA	INVESTIGATOR	3T8
042	LOWREY	LEE	FAA	SURVIVAL ASPECTS CHAIR.	2T8
011	MARTIN	DENNIS	FAA	POST-IMPACT INVES.	1T8
339	MCCLURE	M.	FAA	VIP	1 (IDO)
067	MEABULAN	CHARLES	FAA		
212	MEILICK	R.	FAA	INSPECTION TEAM	3T8
208	MEILICKE	R.	FAA	VIDEO	IDO/1
215	MESHLUM	C.	FAA	INSPECTION TEAM	3T8
025	MICAEL	ROBERT	FAA	STILL PHOTOGRAPHY	1T8
114	NELSON	DICK	FAA	STRUCTURES CHAIRMAN	3T8
146	NERI	LAREY	FAA	DOC. RESEARCH TEAM	1T3/9T10
147	NUCKOLLS	CHARLES	FAA	DOC. RESEARCH TEAM	1T3/9T10
110	PEDRIZETTI	FRANK	FAA	INVESTIGATOR	3T8
217	PONTECORVO	J.	FAA	INSPECTION TEAM	3T8
002	REED	JOHN	FAA	FAA PROJECT MANAGER	1T30
188	REESE	TERRY	FAA	INVESTIGATOR	3T8
144	SCHROEDER	DON	FAA	DOC. RESEARCH TEAM	1T3/9T10
343	SCOTT	BARRY	FAA	DOC. RESEARCH TEAM	1T3/9T10
138	SOLTIS	STEVE	FAA	DOC. RESEARCH TEAM	1T3/9T10
189	TENDEL	MARVIN	FAA	MOTION PICTURE - DOC.	1T30

PARTICIPATING PERSONNEL/ORGANIZATION
DECEMBER 1, 1984
CONTROLLED IMPACT DEMONSTRATION DAY

B #	LAST NAME	FIRST NAME	ORGANIZATION	LAKEBED FUNCTION/TASK	DAYS REQ
149	TRAYBAR	JOE	FAA	DOC. RESEARCH TEAM	1T3/9T10
061	VERTESHER	GORDON	FAA	INVESTIGATOR	3T8
064	VILLELEY	JAMES	FAA	VIDEO	1T8
214	ARMSTRONG	B.	FAA/BOEING	INSPECTION TEAM	3T8
107	BLOMQUIST	RICHARD M.	FAA/BOEING	INVESTIGATOR	3T8
081	DICKENSON	K.	FAA/BOEING	INVESTIGATOR	3T8
087	JONES	THURMAN	FAA/BOEING	ADVISOR TO IIC	2T8
187	PARKS	DON	FAA/BOEING	INVESTIGATOR	3T8
044	PRAEGER	OTTO	FAA/BOEING	ADVISOR TO IIC	2T3
172	PURVIS	JOHN	FAA/BOEING	INVESTIGATOR	3T8
220	THOMAS	I.	FAA/BOEING	INSPECTION TEAM	3T8
341	BURNLEY	JIM	FAA/DOT	VIP	1 (IDO)
334	HECKMAN	CONNIE	FAA/DOT	VIP	1 (IDO)
179	FOGG	LARRY	FAA/DOUGLAS	INVESTIGATOR	3T8
162	SLONONIA	SUE	FAA/DOUGLAS	INVESTIGATOR	3T8
151	LAYMIESTER	KEN	FAA/DOW CHEM.	DOC. RESEARCH TEAM	1T3/9T10
148	RAUSCH	BOB	FAA/DYN SCIE.	DOC. RESEARCH TEAM	1T3/9T10
150	BOYLE	DICK	FAA/HAZ MAT.	DOC. RESEARCH TEAM	1T3/9T10
190	BENNETT	JACQUE	FAA/LEIGH INS	RECORDER/LOCATOR	1T3/9T10
105	STEVINSON	RALPH T.	FAA/LEIGH INS	RECORDER/LOCATOR	1T3/9T10
136	GAMMON	MAX	FAA/LOCKHEED	DOC. RESEARCH TEAM	1T3/9T10
135	GONZMEZ	DAVE	FAA/LOCKHEED	RECORDERS-REMOVAL	1T8
137	LEVOLT	JOHN	FAA/LOCKHEED	DOC. RESEARCH TEAM	1T3/9T10
129	STAUFFER	WARREN	FAA/LOCKHEED	DOC. RESEARCH TEAM	1T3/9T10
350	VERSAW	ED	FAA/LOCKHEED	DOC. RESEARCH TEAM	1T3/9T10
066	WITTLIN	G.	FAA/LOCKHEED	CW. EXP. DOCUMENTATION	1T3/9T10
222	RITTER	T.	FAA/NASA	INSPECTION TEAM	3T8
225	PETTIT	H.	FAA/NAVY	INSPECTION TEAM	3T8
224	SELL	J.	FAA/NAVY	INSPECTION TEAM	3T8
213	BAKER	P.	FAA/NTSB	INSPECTION TEAM	3T8
005	CLARK	JOHN	FAA/NTSB	INSPECTION TEAM	3T8
010	LAYNOR	BUD	FAA/NTSB	ADVISOR TO IIC	
017	VON HEUSEN	ROBERT	FAA/NTSB	INVESTIGATOR	3T8
065	WHITE	JOHN	FAA/NTSB	INSPECTION TEAM	3T8
218	BAILIFF	B.	FAA/P&W	INSPECTION TEAM	3T8
211	NORTH	B.	FAA/P&W	INSPECTION TEAM	3T8
143	CANNON	MARK	FAA/SIMULA	DOC. RESEARCH TEAM	1T3/9T10
142	DESJARDEN	STAN	FAA/SIMULA	DOC. RESEARCH TEAM	1T3/9T10
141	LAANANEN	DAVE	FAA/SIMULA	DOC. RESEARCH TEAM	1T3/9T10
140	ZIMMERMAN	DICK	FAA/SIMULA	DOC. RESEARCH TEAM	1T3/9T10
216	PARRY	J.	FAA/USAF	INSPECTION TEAM	3T8
223	ROGET	A.	FAA/USAF	INSPECTION TEAM	3T8
221	TILSON	J.	FAA/USAF	INSPECTION TEAM	3T8
071	WATTERS	DAN	FAA/USN TEST	RECORDER/LOCATOR	1T3/9T10
N/A	BELL	WILLIE A.	FIRE DEPT.	FIRE CHIEF	
N/A	SMITH	K.O.	FIRE DEPT.	TRAINING	
133	BOULLAY	EDMOND	FRENCH EMB.	DOC. RESEARCH TEAM	1T3/9T10
052	BONNEAU	ALLEN	GE	LAKEBED	1 (IDO)
055	MANN	C.	GE	LAKEBED	1 (IDO)

PARTICIPATING PERSONNEL/ORGANIZATION
DECEMBER 1, 1984
CONTROLLED IMPACT DEMONSTRATION DAY

B #	LAST NAME	FIRST NAME	ORGANIZATION	LAKEBED FUNCTION/TASK	DAYS REQ
049	MORGAN	C. F.	GE	LAKEBED	1 (IDO)
057	RICHARD	J.	GE	LAKEBED	1 (IDO)
050	SELLECK	WALT	GE	LAKEBED	1 (IDO)
207	BIXLER	W.	JPL	HARD LINE REMOTE	1T3
103	BORST	CORY	JPL	VIDEO CAMERMAN	1T3
200	BRIDGES	STEVE	JPL	VIDEO	1T3
089	BURKE	EUGENE	JPL	STILL SUPPORT	1T3
116	BURKE	TONI	JPL	STILL-SUPPORT	1T3
078	DAWSON	JACK	JPL	PHOTO LAB	1T14
095	GLAZER	STU	JPL	IR CAMERA	1T3
016	GREGOIRE	JOHN	JPL	PHOTO LAB	1T30
171	HAGOOD	BOB	JPL	IR. CAMERA	1T3
098	HANCHETT	GREGG	JPL	VIDEO SOUNDMAN	1T3
201	HANSON	R.	JPL	HARD LINE REMOTE	1T3
091	HEWITT	JOHN	JPL	OBSERVER	1T3
164	HORNADAY	BILL	JPL	IR. CAMERA	1T3
203	KIKKER	S.	JPL	AMK SUPPORT	1T3
170	LACHATA	CAROL	JPL	STILL PHOTOGRAPHY	1T30
043	MANENSE	MARIAN	JPL	VIDEO	1 (IDO)
034	MAUGHAN	GORDON	JPL	M/P CAMERAMAN	1T30
121	PATTERSON	DUANE	JPL	STILL PHOTOGRAPHY	1T30
045	ROWE	BILL	JPL	M/P CAMERAMAN	1T30
205	SMITHER	R.	JPL	AMK SUPPORT	1T3
209	SWANSON	P.	JPL	IR FLAIR (ALT.)	1 (IDO)
070	WYNNE	TOM	JPL	STILL PHOTOGRAPHY	1T30
169	BYERS	RUSS	JPL/EDWARDS	EQUIP. RETRIVAL	1T3
101	TIBBETTS	BILL	JPL/EDWARDS	ON-BOARD CAMERA & STILL	1T30
068	VARLEY	DICK	JPL/EDWARDS	ALTERNATE PHOTOGRAPHER	1T3
206	OSTER	R.	JPL/TABLE MT.	GENERATOR OPER. (ALT.)	1T3
166	ARREOLA	HECTOR	JPL/VAFB	BOSS	1T3
184	BORLAND	DICK	JPL/VAFB	PHOTO	1T3
118	ESCARSEGA	OSCAR	JPL/VAFB	PHOTO	1T3
178	FAIL	TERRY	JPL/VAFB	TRACKER REMOTE	1T3
180	FRANZ	ELMER	JPL/VAFB	ELECTRONICS	1T3
163	GIBSON	RICHARD	JPL/VAFB	TIMING	1T3
077	KRURGER	ERNIE	JPL/VAFB	TIMING	1T3
204	STASHAK	W.	JPL/VAFB	REMOTE/TRACKER	1T3
037	SZCZUROSKI	FRANK	JPL/VAFB	PHOTO	1T3
191	TRIMM	PARKER	JPL/VAFB	PHOTO	1T3
124	ALFARO	E.	LARC	CW. EXP. DOCUMENTATION	1T3
008	AUSTIN	FRED	LARC	QA INSPECTOR	1T3/9T30
194	BLANKENSHIP	CHARLES P.	LARC	STRUC. DAMAGE ASSESS.	1 (IDO)
106	BRUCE	FORREST	LARC	PHOTO CAMERA LOADING	1T3/930
130	CALLOWAY	R.	LARC	CW. EXP. DOCUMENTATION	1T3
193	CARD	DR. MICHAEL	LARC	STRUC. DAMAGE ASSESS.	1 (IDO)
082	DENNIS	DALE	LARC	DAS PREFLIGHT	1T3/9T30
021	FASANELLA	E.	LARC	CW. EXP. DOCUMENTATION	1T3
073	HAMILTON	CARL	LARC	EQUIP. REMOVAL	9T30
088	HAYDUK	BOB	LARC	PHOTO SUPPORT TEAM	2T3/9T30

PARTICIPATING PERSONNEL/ORGANIZATION
DECEMBER 1, 1984
CONTROLLED IMPACT DEMONSTRATION DAY

B #	LAST NAME	FIRST NAME	ORGANIZATION	LAKEBED FUNCTION/TASK	DAYS REQ
084	JUASCAGE	MIKE	LARC	DAS/PHOTO SYS. SEALING	1T3
092	KNIGHT	V.	LARC	CW. EXP. DOCUMENTATION	1T3
040	LLOYD	HUBERT	LARC	PHOTO CAMERA LOADING	1T3/9T30
035	MAY	CLYDE	LARC	PHOTO CAMERA LOADING	1T3/9T30
195	MCCOMB	HARVEY G.	LARC	STRUC. DAMAGE ASSESS.	1 (IDO)
181	MCCORMICK	ROYCE	LARC	EQUIP. REMOVAL	9T30
176	PRIDE	JOE	LARC	EQUIP. REMOVAL	9T30
100	TAYLOR	DOUG	LARC	DAS PREFLIGHT	1T3/9T30
024	LEROY	GRAHAM	LAS	POST-IMPACT INVES.	1T8
054	AJIROGI	CARL	NASA	GOM SUPPORT	AS NEEDED
006	ALLEN	ROBERT	NASA	DEP. GOM/CC	1T30
007	ANDERSON	HERB	NASA	OPS SUPPORT - TAKE OFF	1T30
033	BAILEY	CHARLES	NASA	LAKEBED - BACKUP	1 (IDO)
117	BAIN	DAN	NASA	RELIEF TEAM - SAFING	1 (IDO)
001	BARBER	RUSS	NASA	PROJECT MANAGER	1T30
058	BARNETT	LARRY	NASA	NASA 11	AS NEEDED
111	BARNICKI	ROGER	NASA	GOM/CC	1T30
104	BISCAYART	LARRY	NASA	INSPECTOR	1 (IDO)
003	CARLSON	GARY	NASA	RELIEF TEAM - SAFING	1T3
027	COHN	ROBERT	NASA	LAKEBED - SUP/BREATHING	1T3
051	COMBS	HUBERT	NASA	LAKEBED	1 (IDO)
075	CONE	RANDY	NASA	NASA 16 - BACKUP NASA 1	0
074	CULLUM	RALPH	NASA	DRIVER - NASA 11	1T30
079	DELANEY	ROBERT	NASA	NASA 11 - ESCORT B/U	0
020	EDGEWORTH	JAMES	NASA	NASA 22 - 'C' BAND BEAC	1 (IDO)
022	FEDOR	FRANK	NASA	SAFING TEAM #2	1T3/9/30
039	FUENTES	ELOY	NASA	QUALITY ASSURANCE	1 (IDO)
030	GLEASON	ROBERT	NASA	BREATHING (0)2	1T3
096	GONZALES	ROBERT	NASA	RELIEF TEAM - SAFING	1T3
053	HALEY	CLARENCE	NASA	LAKEBED EQUIPMENT - GSA	AS NEEDED
198	HORTON	VICTOR	NASA	FLT. ENG.-COCKPIT SETUP	1
085	JAMESON	DONALD	NASA	TAPE/FILM RECOVERY	1T3
094	KINN	JOSEPH	NASA	SAFING TEAM #1	1T3
041	LOREK	TONY	NASA	A/C CREW (BOB COHN)	1 (IDO)
036	MATHIESON	JIM	NASA	OPS SUPPORT - TAKE OFF	1T30
197	MC MURTRY	TOM	NASA	PILOT-COCKPIT SETUP	1 (IDO)
127	MCCARTY	WILLIAM	NASA	MEAS. & IMPACT	1 (IDO)
056	MEYER	MARTA	NASA	LAKEBED - MEAS. & IMPAC	1 (IDO)
342	MEYER	ROBERT	NASA	BACKUP - B. MCCARTY	1 (IDO)
026	MISPLAY	JOE	NASA	SAFING TEAM #1	1T3/930
113	NAKATA	RAYMOND	NASA	NASA-15	1 (IDO)
119	NICE	ED	NASA	RELIEF TEAM - SAFING	1T3/30
108	PACEWITZ	GARY	NASA	NASA INSPECTION - #1	1 (IDO)
N/A	PAINE	GORDON	NASA	OPS. ENGINEER	0
122	PETERSEN	WILLIAM R.	NASA	CID 720 CREW	AS NEEDED
048	ROOK	JAMES	NASA	NASA-15	1 (IDO)
047	SABO	WILLIAM	NASA	NASA-16	1 (IDO)
046	SAHAI	JOSEPH	NASA	SAFING TEAM #2	1T3/9T30
097	SAWYER	RALPH	NASA	AVIONICS	1 (IDO)

PARTICIPATING PERSONNEL/ORGANIZATION
DECEMBER 1, 1984
CONTROLLED IMPACT DEMONSTRATION DAY

B #	LAST NAME	FIRST NAME	ORGANIZATION	LAKEBED FUNCTION/TASK	DAYS REQ
031	SHUCK	ROBERT	NASA	BREATHING (O)2	1T3/9T30
059	STONE	JULIE	NASA	SHUTTLE DRIVER	1T3
060	TOWNSEND	DARYL	NASA	RELIEF TEAM - SAFING	1T3/9T30
032	WALLICK	HAROLD	NASA	AVIONICS	1 (IDO)
351	WEBBER	GENE	NASA	OPS SUPPORT - TAKE OFF	1T3/9T30
196	VENNERI	SAMUEL L.	NASA HQ.	STRUC. DAMAGE ASSESS.	1 (IDO)
019	SWEENEY	AL	PRATT & WHITN		
102	TROMBECKY	BRUCE	PTMAGU/HELO.		1 (IDO)
192	WINNY	GERALD	PTMAGU/HELO.		1 (IDO)
N/A	ANDERSON	RICK	QUINTRON	TV 28 (NASA 28)	0
N/A	DICKERSON	TERRY	QUINTRON	TV 28 (NASA 28)	0
347	SIDDLE	ROBERT	QUINTRON	TV 1 - IMPACT CAMERA	1 (IDO)
N/A	WHEATON	TED	QUINTRON	TV 3 - RADIO SUPPORT	0
349	YEE	DON	QUINTRON	TV 2 - IMPACT CAMERA	1 (IDO)
N/A	ZEIGER	EARL	QUINTRON	RACOMM - MCC SUPPORT	0
139	LLOYD	ROGER	RMS	DOC. RESEARCH TEAM	1T3/9T10
156	FERNANDEZ	JOSE 'CHIPPY'	SERV-AIR	SECURITY & SAFE BOUND.	1T3/9T30
157	GREEN	DANNY	SERV-AIR	SECURITY & SAFE BOUND.	1T3/9T30
158	HENSON	CHICK	SERV-AIR	SECURITY & SAFE BOUND.	1T3/9T30
159	HOWARD	PAM	SERV-AIR	SECURITY & SAFE BOUND.	1T3/9T30
160	IRIZARRY	ENRIQUE	SERV-AIR	SECURITY & SAFE BOUND.	1T3/9T30
210	JACKSON	D.	SERV-AIR	SUPV. SERV-AIR PERSONNE	1T30
161	KLINE	WALLY	SERV-AIR	SECURITY & SAFE BOUND.	1T3/9T30
018	MYERS	DON	SERV-AIR	SECURITY & SAFE BOUND.	1T3/9T30
015	PERCIVAL	TOM	SERV-AIR	SECURITY & SAFE BOUND.	1T3/9T30
128	PITCHER	JACK	SERV-AIR	SECURITY & SAFE BOUND.	1T3/9T30
219	ROE	MICHAEL	SERV-AIR	SAFETY INSPECTOR	1T3/9T30
344	STEWART	PAUL	SERV-AIR	SECURITY & SAFE BOUND.	1T3/9T30
345	TRIPPIEDI	JIM	SERV-AIR	SECURITY & SAFE BOUND.	1T3/9T30
109	BUTTERFIELD	VERYL	SMITH ENGR.	GENERATORS - LAKEBED	1 (IDO)
155	CHAMBERS	LARRY	SMITH ENGR.	GENERATORS - LAKEBED	1 (IDO)
153	DOW	GERALD	SMITH ENGR.	DISPATCHING OF EQUIP.	1 (IDO)
154	HOMIAK	ANDREW	SMITH ENGR.	DISPATCHING OF EQUIP.	1 (IDO)
N/A	MORROW	DWIGHT	SMITH ENGR.	DISPATCHING OF EQUIP.	0
N/A	ROLOF	ELMER	SMITH ENGR.	DISPATCHING OF EQUIP.	0
N/A	VOLK	GEORGE	SMITH ENGR.	LAKEBED EQUIP.-LEADMAN	0
N/A	WEMPLE	VERNON	SMITH ENGR.	EQUIP. MONITOR - SUPVR.	0
093	KLINE	BILL	SPIN PHYSICS	VIDEO	1 (IDO)
062	WEATHERFORD	JIM	SPIN PHYSICS	VIDEO	1 (IDO)
182	WHIPPIE	WILHAM	SPIN PHYSICS		1 (IDO)
186	DODDS	RALPH	SYMBOLIZED SY	HIGH SPEED VIDEO	1 (IDO)
177	FENTON	EDWARD	SYMBOLIZED SY	HIGH SPEED VIDEO	1 (IDO)
168	HEAGY	ROBERT	SYMBOLIZED SY	HIGH SPEED VIDEO	1 (IDO)
115	NAGY	JOHN	TRI-TRONICS	VIDEO	1 (IDO)
185	NATALE	CARMEN	VISUAL INST.	VIDEO	1 (IDO)
167	PENDLY	GIL	VISUAL INST.	VIDEO	1 (IDO)
132	CRESS	GORDON	WEBER ACFT.	DOC. RESEARCH TEAM	1T3/9T10
009	BAILEY	R.	ZYBION		1 (IDO)
038	FROST	D.	ZYBION		1 (IDO)

PARTICIPATING PERSONNEL/ORGANIZATION
DECEMBER 1, 1984
CONTROLLED IMPACT DEMONSTRATION DAY

B #	LAST NAME	FIRST NAME	ORGANIZATION	LAKEBED FUNCTION/TASK	DAYS REQ
202	MCGHEE	D.	ZYBION	VIDEO SUPPORT (ALT.)	1T3

APPENDIX W

Arriflex 16S/B, 16S/B-GS and Arriflex 16M
PRICE SCHEDULE

D. B. Milliken Company, DBM 5C, 16MM MOTION PICTURE CAMERA WITH INTERMITTENT
FILM TRANSPORT AND POSITIVE REGISTRATION PIN

INSTRUMENTATION MARKETING CORP. Spec/Data Sheet
Model 16mm-1VN, Series 2000 16mm-1PL, Series 2000 35mm-4ML, 70mm Camera

TriTronics, Inc.
PSC-1000, PCSC-2300, PCSM 6500

Spin Physics, Inc.
SP2000 System: Camera, Signal Processing, Recorder, Video Processing, Display

Inframetrics
IRTV-445 Infrared Imaging System

Hasselblad 500EL/M

Gordon Enterprises
HULCHER 35mm SEQUENCE CAMERA

Nikon
Nikon Cameras: F2A Photomic, F2AS Photomic, FE, Nikonos III

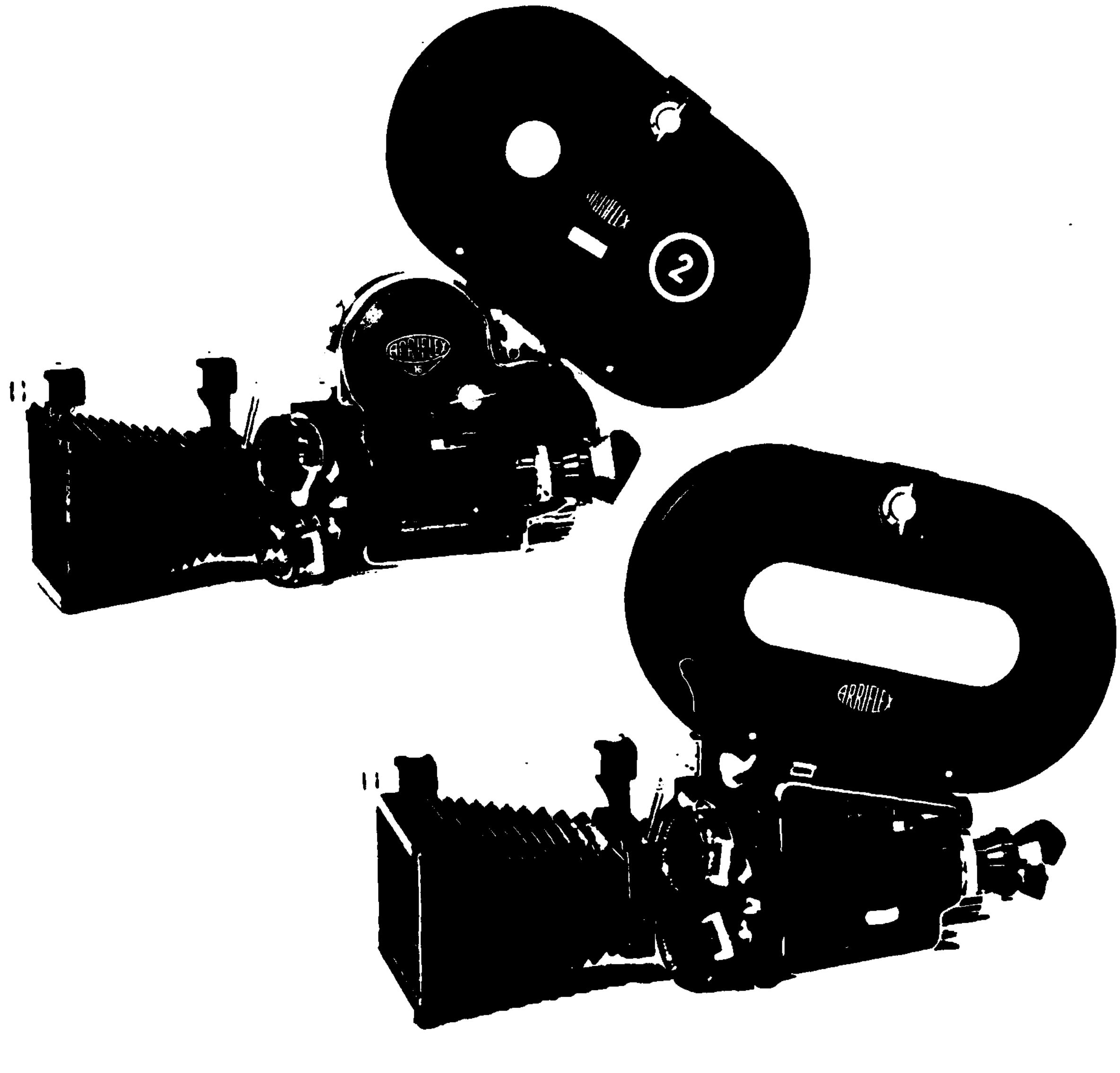
Eastman Kodak Company
5294 35mm, Eastman Color High Speed Negative Film; 7239 16mm,
Video News Film (Daylight); 7251 16mm, High Speed Daylight Film;
7291 16mm, Color Negative Film; 7294 16mm, Color High Speed Negative Film

Visual Instrumentation Corporation
OE-84B Optical Tracking System

September 1, 1968
Revised March 1, 1969

ARRIFLEX 16S/B, 16S/B-GS and ARRIFLEX 16M

PRICE SCHEDULE



ALL PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Technical Data

Dimensions:

Length, measured from lens flange	10.4" (264 mm)
Width	4" (100 mm)
Height	7.7" (195 mm)

Weight of camera:

approx. 12.5 lbs (5.8 kg)

Film width:

16 mm, one-sided or double perforation,
B winding

Shutter opening:

180°

Viewfinder magnification:

10-fold

Noise level:

28 ± 2 dB (A)

Drive:

DC motor
Supply voltage 12 V
Crystal accuracy 5×10^{6}

Battery type:

12 V, 1.2 Ah NC

Magazines:

400 ft (120 m) magazines, coaxial double compartment type, daylight reels can be used up to max. 200 ft (60 m)

Temperature range:

-12.5° F to 131.0° F (-25° C to +55° C)

Exposure Control System:

Film sensivity:
13-28 DIN (16-500 ASA)
Frame speed:
25 (24) - 64 fps
Indication range:
±2 f-stops

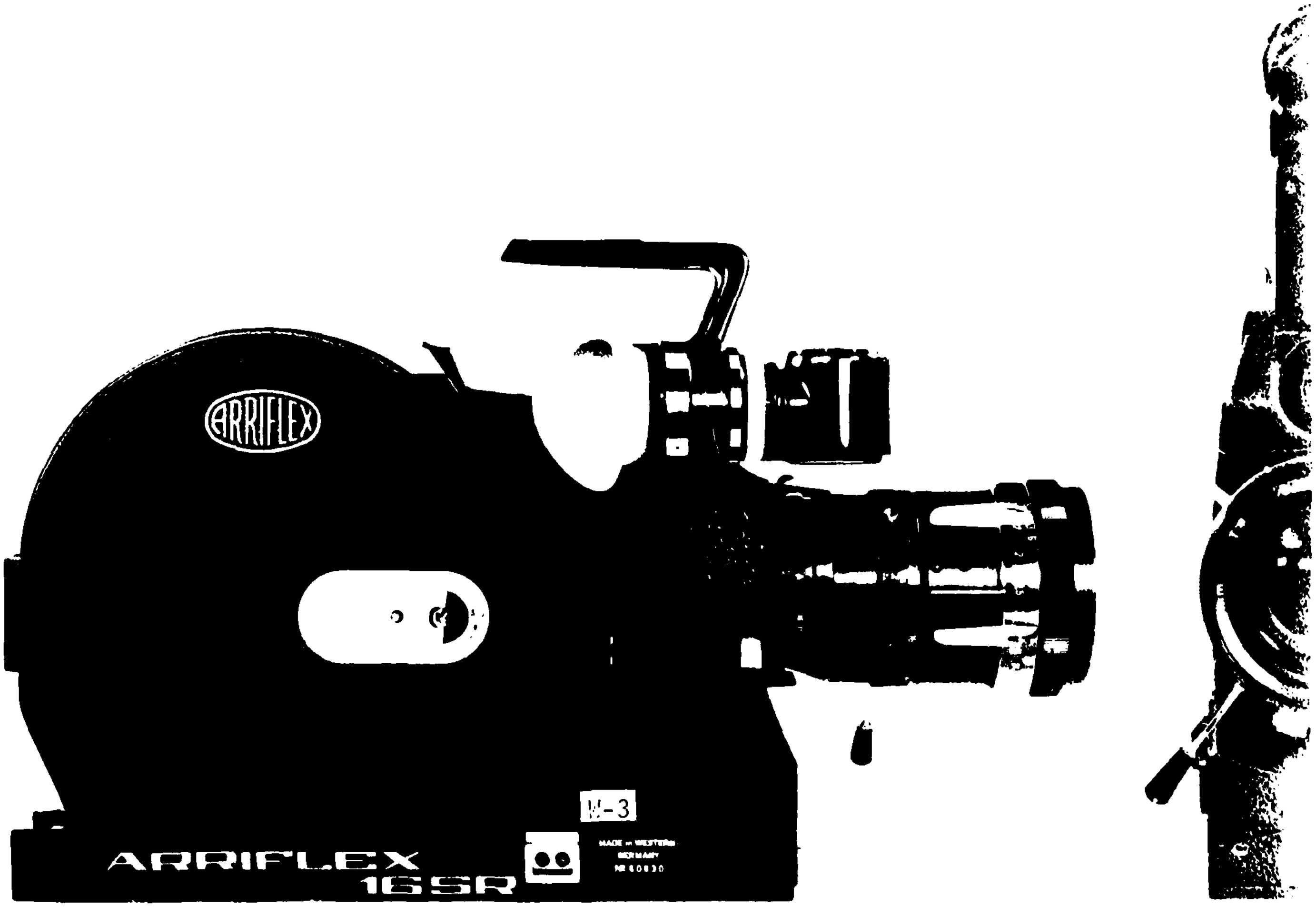
Experienced motion picture and television professionals all over the world continually give our engineering staff new impetus for performance-improving innovations. To meet the most exacting demands, our firm has produced an up-to-the-minute, highly versatile system für 16 mm synchronous picture-sound shooting:

The ARRIFLE

Printed in West Germany

Experienced motion picture and television professionals all over the world continually give our engineering staff new impetus for performance-improving innovations. To meet the most exacting demands, our firm has produced an up-to-the-minute, highly versatile system für 16 mm synchronous picture-sound shooting:

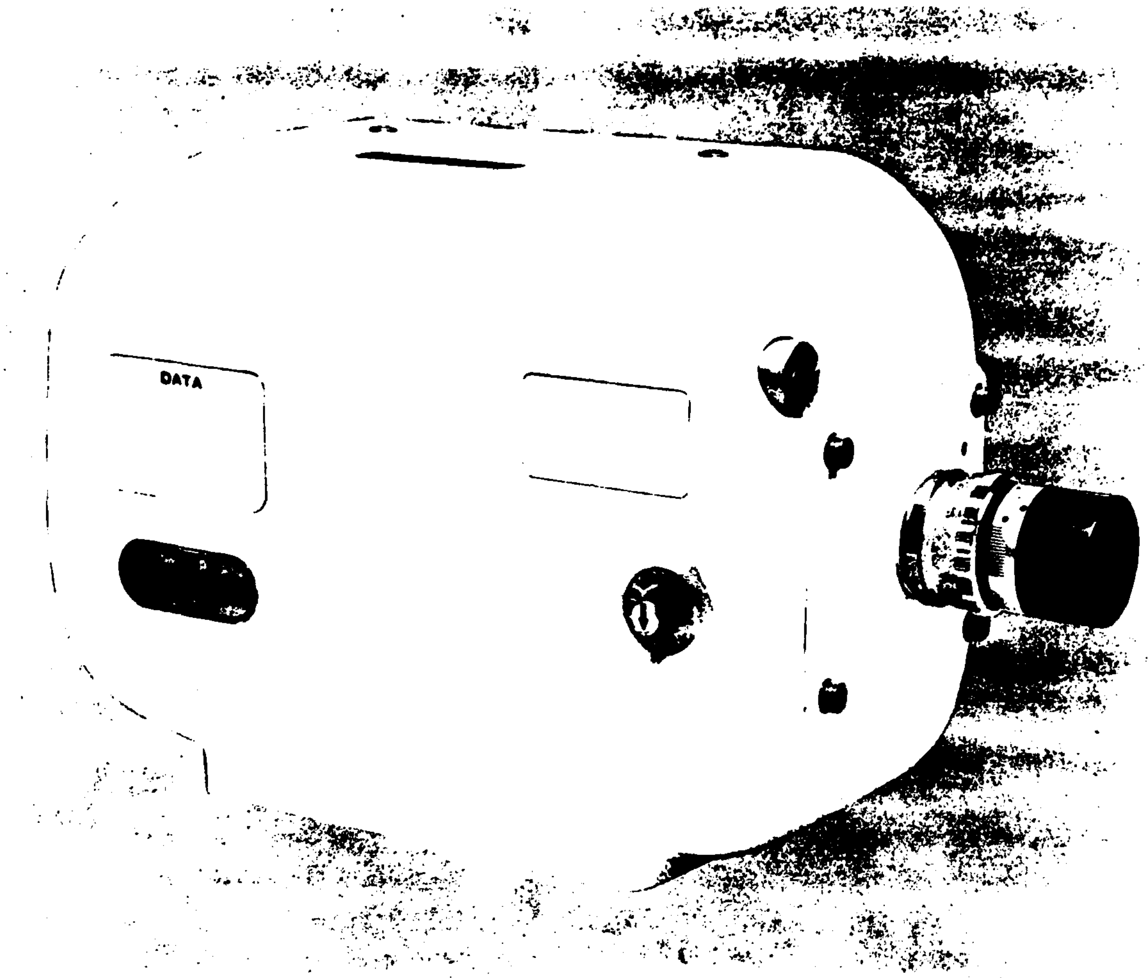
The ARRIFLEX 16 SR



DBM 5C

16MM MOTION PICTURE CAMERA WITH INTERMITTENT FILM TRANSPORT AND POSITIVE REGISTRATION PIN

400 foot internal film capacity with speeds from 4 to 400 F.P.S.



Standard equipment for an illustrious list of the nation's top missile contractors and space test facilities, the DBM 5C has earned its enviable reputation for critical quality under the toughest environmental conditions. Many users have standardized on this camera. For example: Vandenberg Air Force Base uses the 5C to handle close up surveillance of all missile launches while NASA-Marshall Space Flight Center, General Dynamics/Astronautics, Edwards Air Force Base, Aerojet-Sacramento and Martin-Marietta-Denver use the 5C to cover all static engine tests. The famous Milliken intermittent movement with register pin consistently produces highest image quality *even when the camera looks directly into the exhaust flame of the test vehicles.*

WHEN YOU SPECIFY MILLIKEN . . . you buy a number of remarkable advantages unmatched by any other high speed camera on the market. These include: pictures of exceptional clarity with "studio quality" — at all speeds — made possible by the unique Milliken movement. This intermittent movement with register pin, actually stops the film and locks it during exposure. Because the camera movement describes a circle, and only the film motion itself is intermittent, high inertial loads, that normally wear down high speed cameras, are completely eliminated. Modular construction permits the removal of the complete operating mechanism or any part for convenient cleaning or rapid on-the-job servicing. The industry's lowest current consumption reduces power requirements and significantly contributes to Milliken's compact design and critical weight factor. Milliken cameras are built to withstand the most severe environmental conditions such as, temperatures down to −65°F and altitudes to outer space. Extreme vibration and acceleration loads associated with aerospace operations do not affect the precision performance of these cameras.

D. B. Milliken Company, 131 North 5th Ave. Arcadia, California 91006 • Phone (213) 359-66[illegible]

TECHNICAL SPECIFICATIONS

FILM: 16mm ASA standard, perforated two sides, black and white or color. Camera is adjusted to high speed perforations (0.3000 pitch). Adjustment for short pitch (0.2994) optional at no extra charge.

FILM CAPACITY: 400 feet, accepts 100, 200 or 400 foot daylight loading spools.

CINE SPEED: 4 fps to 400 fps according to motor selection.
Low speed motor: 4, 6, 8, 12 fps.
Medium speed motor: 16, 24, 32, 48 fps.
High speed motor: 64, 128, 200, 400 fps.

SPEED STABILITY: ± 1½ % at 400 fps.

SHUTTER SPEED: From 1/9 sec. to 1/19,000 sec. Standard shutter openings: 7½°, 10°, 18°, 36°, 60°, 72°, 120°, 140°, and 160°.

FOOTAGE INDICATOR: Automatic resetting.

WEIGHT: 13 pounds (less film).

POWER REQUIREMENT: 28 volt DC or 115 volt AC.

CURRENT CONSUMPTION: 7.5 amperes DC at 400 fps. 3.0 amperes AC at 400 fps.

CUT-OFF SWITCH: Heavy duty micro-switch automatically stops camera at end of film run.

HEATER: Dual AC-DC heater mounted on camera mechanism plate.

TIMING LIGHTS: NE-2J high-brightness neon lamps.

CORRELATION PULSE GENERATOR: Produces an output pulse at a frequency synchronous to the camera shutter.

LENS: 25mm f/2 Kinoptik standard, other focal lengths available on request.

LENS MOUNT: "C" Mount standard, other types available on request.

MOUNTING PROVISION: Dovetail plate on camera, tapped ¼-20 and ⅜-16 for tripod. Plate fits accessory M-03 mount.

FINISH: Glossy white enamel.

OPERATIONAL ENVIRONMENT:
Acceleration: 25 G's in both directions of three principal axes.
Temperature: −65° F.
Vibration: Has been qualified under very severe conditions; for example, 5 to 5000 cps with 10 G peak loading.

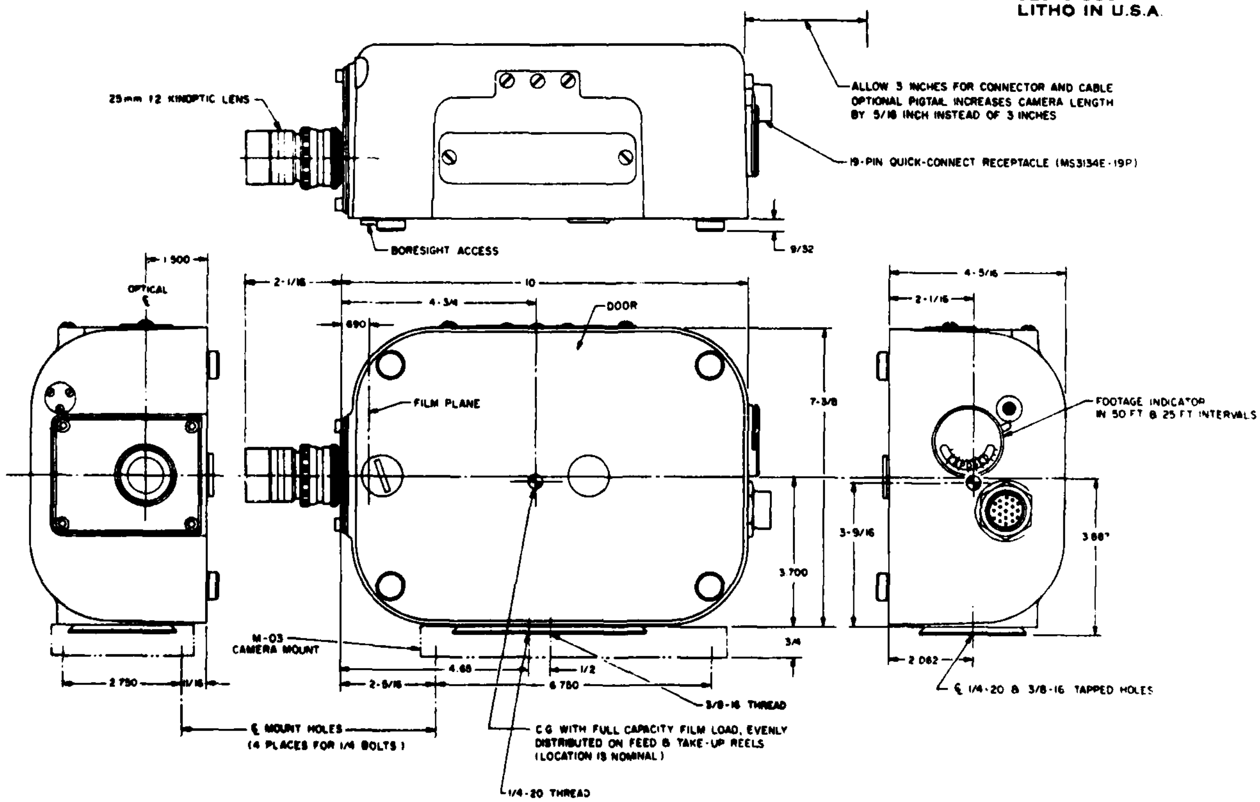
STANDARD EQUIPMENT: All features described above are standard equipment. Mating connector is supplied. One high speed DC motor is furnished. Medium or low speed motor may be substituted at slight extra cost. One 72° shutter is furnished; and other standard shutter may be substituted.

ACCESSORIES AND OPTIONAL EQUIPMENT: Boresight, carrying case, camera mounts, 1200-foot magazine, pistol grip, tracking viewfinder, pulse motor, autocollimator, and tripods. See separate sheets describing accessories.

NOTE: Frame rates of 64, 128, 250, 500 fps are available by ordering Model DBM-5D.

These specifications are subject to change without notice.

SLD 5-865
LITHO IN U.S.A.



INSTRUMENTATION MARKETING CORP.

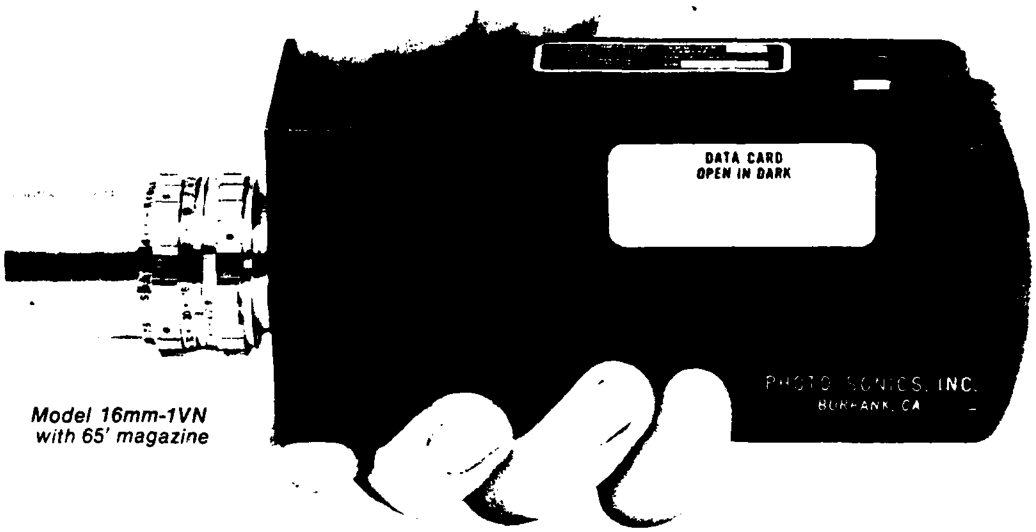
820 S. Mariposa St., Burbank, CA 91506/Phone 213 849-6251, [illegible]

Spec/Data Sheet

January 1985

Photo-Sonics miniature magazine loading camera Model 16mm-1VN

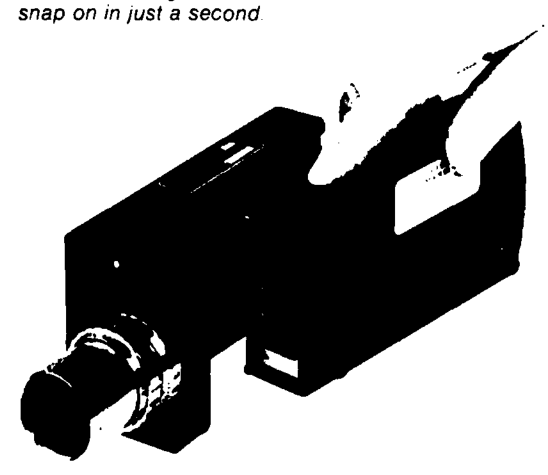
High-speed intermittent pin-registered



Model 16mm-1VN with 65' magazine

Extremely small, compact . . . and versatile!

16mm-1VN magazines snap on in just a second



In fact, the 16mm-1VN is smaller than many Super 8mm cameras, but provides all the high quality and ruggedness of 16mm equipment.

A field-proven movement is used incorporating 2 pull-down pins and 2 register pins housed in the magazines, available in 65', 100' and 200' capacities.

A special wide aperture gives even more pictorial data. Pulse/cine versions and high-speed cine versions designed for plug-on automatic exposure control . . .

Standard specifications –

Frame rate:

16mm-1VN-100, pulse up to 12 pps., cine rates of 16, 24, 48, 64, 72 and 100 fps
Note: 200' magazine, 6 pps. max.

16mm-1VN-200, cine rates of 24, 48, 64, 100, 150 and 200 fps

16mm-1VN-50, pulse up to 8 pps.; cine up to 50 fps.
Accuracy ± 2% or ± 2 frames, whichever is greater.

Aperture size: .296" × .552".

Film specifications: Uses both .3000" pitch (USA PH 22.5-1953) and .2994" pitch (USA PH 22.110-1965), both 4 mil and 6 mil with no adjustments.

Film capacity: 65', 100', and 200', magazines (using 4 mil film) plus 100' daylight load using standard 6 mil film.

Film transport: Intermittent; two register pins and two pull-down pins with film held captive in aperture gate at all times.

Shutter: Fixed 120°, substitution of one fixed 9°, 18°, 36° and 72° available at no additional cost at time of purchase.

Shutter output pulse:

Pulse level: 5V ± 1V at 4.7K ohms load.

Pulse width: Fixed, 0.1 msec.

Impedance: 820 ohms.

Occurrence: Once per frame at mid-shutter point for cine camera and 82° delayed for pulse camera.

Timing lights: Two LEDs, one each side of film outside picture area.

Power: 28V DC ± 4V, 2.5 amps max. at 200 fps.

Operating range: −20°C to 65°C.

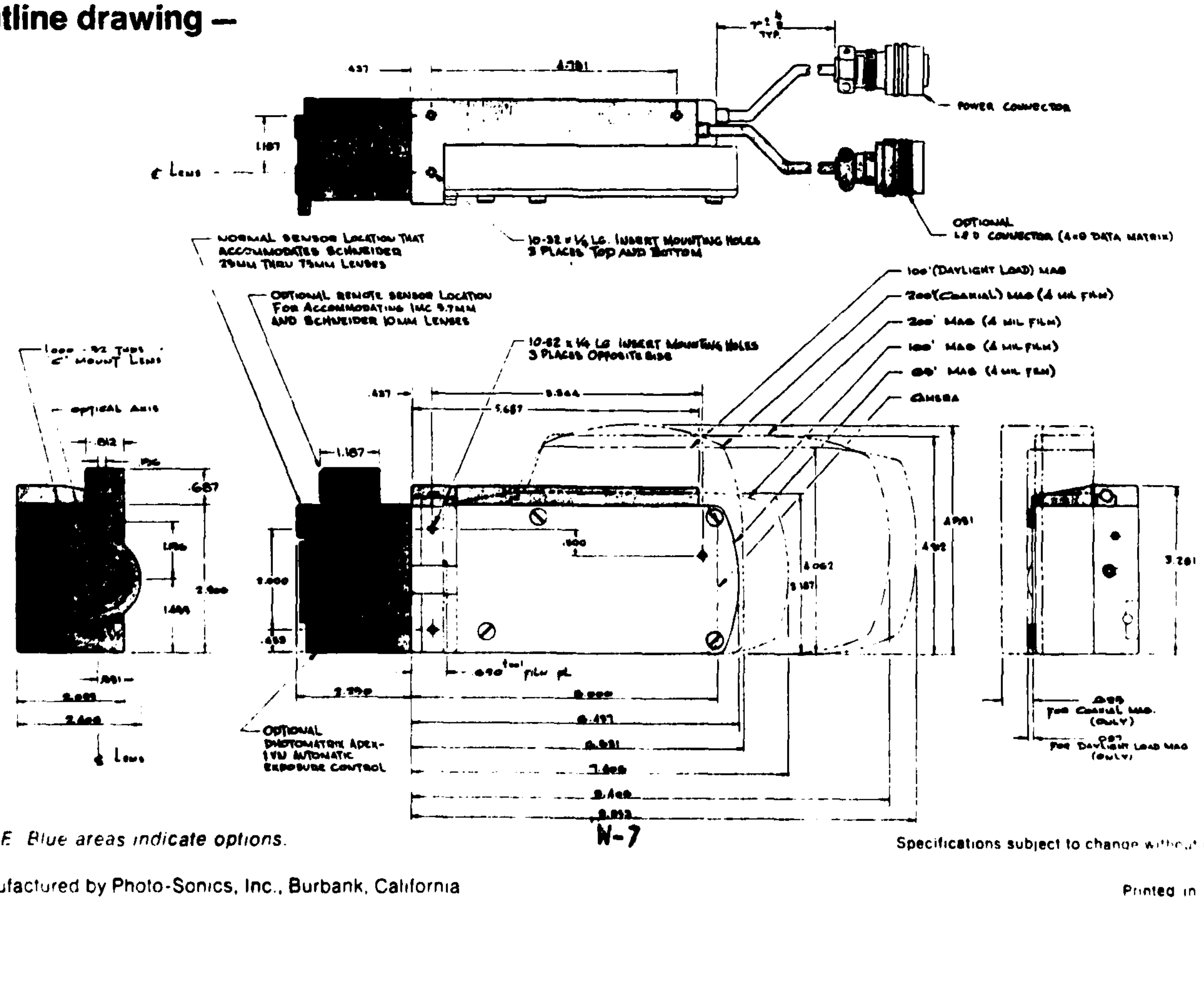
Weight: 1.5 lbs. (camera body only)

Mounting: Top, bottom and side mounting provisions

Lens mount: "C" (USA PH 22.76)

Heater: 28V, 100 watts (115V special order.)

Outline drawing –



NOTE: Blue areas indicate options.

Specifications subject to change without notice

Manufactured by Photo-Sonics, Inc., Burbank, California

Printed in U.S.A.

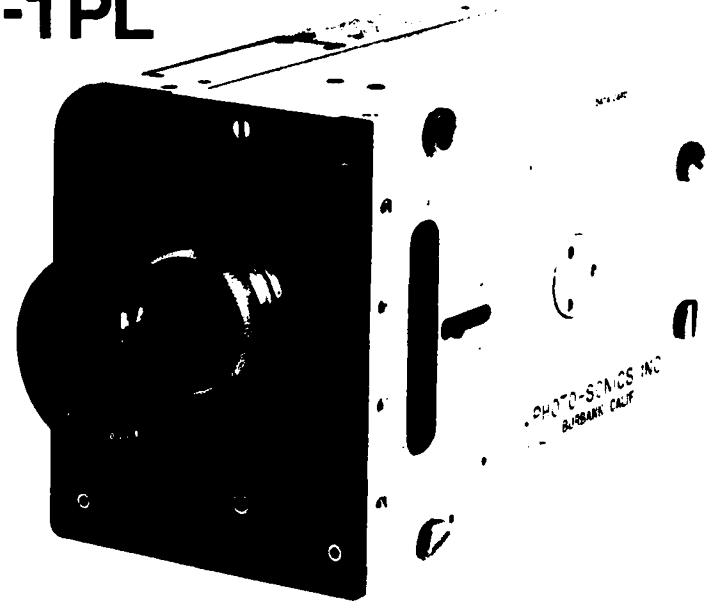
INSTRUMENTATION MARKETING CORP.
Exclusive Distributors
820 S. Mariposa St., Burbank, CA 91506 Phone 213 849 6251, Telex 67 3205

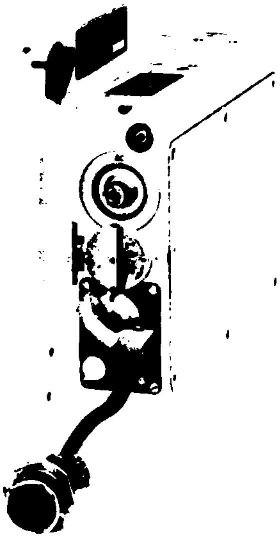
Spec/Data Sheet

August 1981

Photo-Sonics magazine loading camera Series 2000 16mm-1PL

High-speed intermittent pin-registered





The most versatile 16mm motion picture camera available today . . . capable of time-lapse, normal speed, and up to 500 fps . . . featuring interchangeable magazines of 200′, 400′ and 1200′, plus the new state-of-the-art synchronous phase lock option!

This unique, rugged data recording camera is exceptionally clean in mechanical and electrical design for high reliability to meet exacting requirements for time-lapse to medium high-speed motion picture jobs today.

Unique features –

- The body is always the same size; overall size is only increased when the 400′ or 1200′ magazines are used.
- Variable shutter can be externally adjusted quickly and easily with no tools: no re-timing of camera required.
- Neon or LED timing lights may be easily replaced from outside the camera, without disturbing the film load.
- Convert to pulse configuration in approximately 30 minutes with kit, using standard tools; no soldering is required. No need to purchase a complete new camera.
- Front plate anodized flat black with a power connector for Apex-B automatic exposure control. The "C" mount is threaded so focusing and iris index are always viewed from the left side of the camera when using Schneider lenses. These lenses are also compatible with the Apex-B.
- Boresight provides positive and direct straight-through viewing. Because of quick-change magazine capability, boresighting can be accomplished in minimum time.
- If usage dictates different film capacities, different film magazines are available rather than purchasing an entire new camera, resulting in considerable cost savings; 200′, 400′ or 1200′ magazines interchange with no adjustment to camera or magazine.
- Each magazine has a spring-loaded viewing port for viewing film and transport.
- Magazines are near-automatic threading with no climbing loop.
- Because the magazine can only be properly threaded one way, timing mark offset is always 14 frames.
- Film magazines can be interchanged in less than 10 seconds and camera/magazine drive interface is automatically aligned.
- All film magazines thread identically and film is always positively locked by either the two register pins or the two pulldown pins. All magazines will accept either .2994″ or .3000″ pitch film with no adjustments.
- Camera body requires no lubrication; minimum lubrication of magazines . . . (only 3 points to oil.)
- All parts are interchangeable from camera to camera. New parts may be installed with no special tools required.
- Standard 16-1PL camera can be converted to reflex viewing by interchanging the "C" mount front plate to the continuous reflex front plate.
- Plug-in DC power amplifier has unique reverse polarity protection including audible alarm to warn operator.
- Phase lock synchronization plug-in module option.
- Remote speed control module option.

Performance Characteristics, 16-1PL –

The camera was designed and developed to obtain high-speed, high-quality motion pictures at frame rates from 10 to 500 frames per second, and in various vibration and acceleration load conditions.

It is designed to withstand acceleration from 10 to 25 Gs, vibration of 5 to 7 Hz at 0.7" d.a. and 17 to 4000 cps at 10 Gs (not applicable to the 1200' magazine).

The camera system is similar in design and construction to the KB-21C Camera system furnished to the Air Force.

The KB-21C was tested in temperature conditions ranging from −65°F to +160°F. The KB-21C was operated and performed to design requirements during these tests. With the 16mm-1PL having a larger heater installed, operation in the lower temperature range should present no problems provided a warm-up period of 3 minutes is allowed prior to camera operation.

Standard specifications, 16-1PL –

Frame rate: 10 to 500 fps by transistorized speed control. Accuracy ±1% or ±1 frame, whichever is greater.

Aperture size: .296" x .410" (USA PH 22.7-1964).

Film specification: Uses both .3000" pitch (USA PH 22.5-1953) and .2994" pitch (USA PH 22.110-1965), both 4- and 6-mil with no adjustments.

Film capacity: 200', 400' and 1200' daylight loading magazines.

Film transport: Intermittent, two registration pins and two pull-down pins with film held captive in aperture gate at all times.

Shutter: Fixed 90°, substitution of one fixed 7.5° to 160° available at no additional cost.

Timing lights: Two, one each side of film outside picture area; uses NE2J lamps. LEDs may be substituted at time of purchase at no additional cost.

Motor: 28V DC, 12 amps at 500 fps typically. Optional at time of purchase, 115V AC 50/400 Hz motor, 3.5 amps at 500 fps typically.
NOTE: An isolation transformer should be used when using 220V AC.

Weight: 6 lbs.

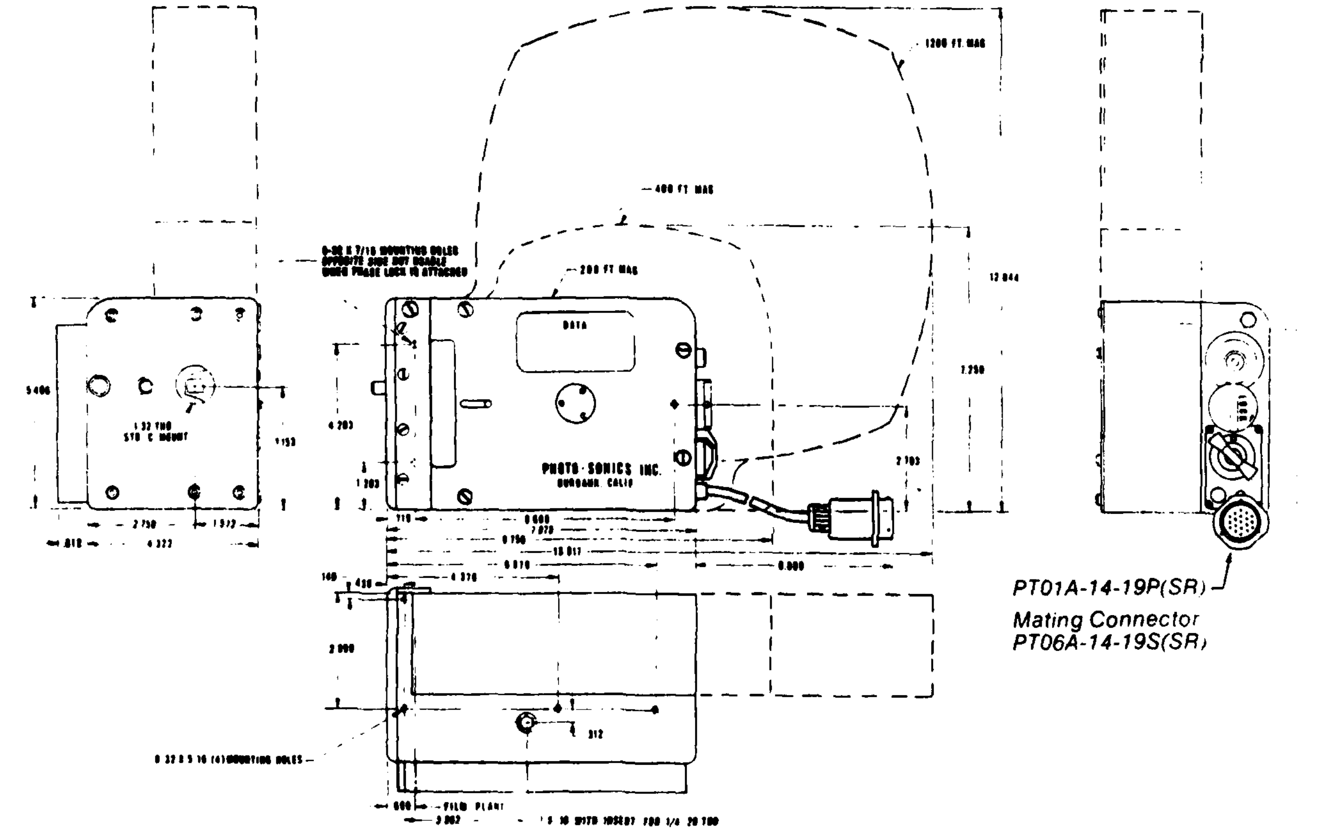
Mounting: 3/8-16 with 1/4-20 insert for tripod; top, bottom and side mounting provisions.

Lens mount: "C" (USA PH 22.76), threaded so that focusing and iris index always appear on the left side of the camera.

Heater: 115V AC or VDC, 300 watts, thermostatically controlled.

Specifications subject to change without notice

Outline drawing –



PT01A-14-19P(SR)
Mating Connector PT06A-14-19S(SR)

NOTE Shaded blue areas indicate optional phase … dule accessory

Manufactured by Photo-Sonics, Inc., Burbank, C… U.S.A.

W-9

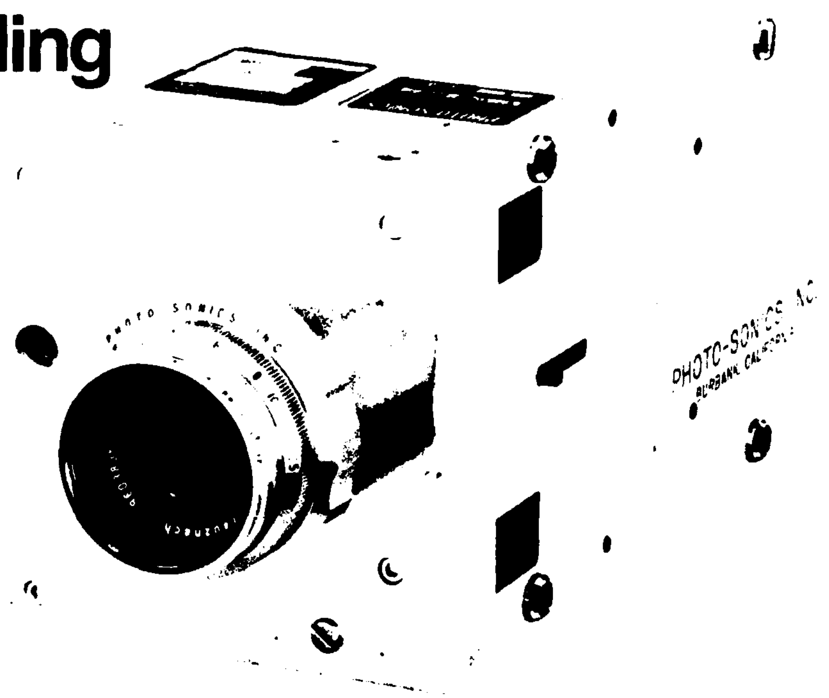
INSTRUMENTATION MARKETING CORP.

820 S. Mariposa St., Burbank, CA 91506/Phone 213-849-6251, Telex 67-3205

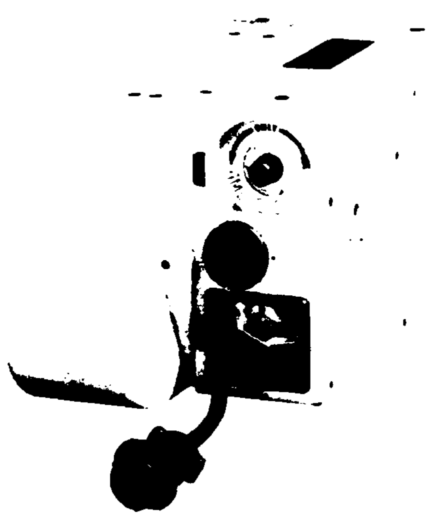
Spec/Data Sheet

January 1985

Photo-Sonics magazine loading camera Series 2000 35mm-4ML



High-speed intermittent pin-registered



The most versatile high-speed 35mm motion picture camera available today . . . capable of normal speed, and up to 200 fps . . . featuring interchangeable magazines of 200′, 400′ and 1000′, plus the new state-of-the-art synchronous phase lock and remote speed control options!

This unique, rugged data recording camera is exceptionally clean in mechanical and electrical design for high reliability to meet exacting requirements for medium high-speed motion picture jobs today.

Unique features –

- Variable shutter can be externally adjusted quickly and easily with no tools; no re-timing of camera required.
- Neon or LED timing lights may be easily replaced from outside the camera, without disturbing the film load.
- Boresight provides positive and direct straight-through viewing. Because of quick-change magazine capability, boresighting can be accomplished in minimum time.
- If usage dictates different film capacities, different film magazines are available rather than purchasing an entire new camera, resulting in considerable cost savings. 200,′ 400′ or 1000′ magazines interchange with no adjustment to camera or magazine.
- Each magazine has a spring-loaded viewing port for viewing film loops.
- Magazines are near-automatic threading with no climbing loop.
- Because the magazine can only be properly threaded one way, timing mark offset is always 7½ frames.
- Film magazines can be interchanged in less than 5 seconds and camera/magazine drive interface is automatically aligned.
- All film magazines thread identically and film is always positively locked by either the two register pins or the four pulldown pins.
- Phase lock synchronization plug-in module option
- Remote speed control option
- Plug-in AC or DC power amplifier has unique reverse polarity protection including audible alarm to warn operator

Standard specifications, 35-4ML

Frame rate: 10 to 200 fps by transistorized variable speed control. Accuracy ± 1% or ± 1 frame, whichever is greater.

Aperture size: 0.745" × 0.995"

Film specification:
- Standard—
  - USA PH22.36 (KS .1870" pitch)
  - USA PH22.139 (KS .1866" pitch)
- Optional—
  - USA PH22.93 (BH .1866" pitch)
  - USA PH22.34 (BH .1870" pitch)

Camera accepts both .004 and .006 inch film. Camera and magazine will accept short or long pitch without modification.

Film capacity: 200 ft. magazine; 400 ft. magazine (horizontal and vertical); 1000 ft. magazine (Coaxial).

Film transport: Intermittent, two registration pins and four pull-down pins with film held captive in aperture gate at all times.

Shutter: Variable rotary disc with openings of 9, 18, 36, 72 and 144 degrees. (Fixed shutters for phase lock optional.)

Timing lights: Two, one each side of film outside picture area, uses NE2J lamps. LEDs may be substituted at time of purchase at no additional cost.

Motor: 115V AC, 50/400 Hz, 4 amps max. at 200 fps. 28V DC 18 amps max. motor available upon request at no additional cost at time of order.

Weight: 9¾ lbs. (camera body only)

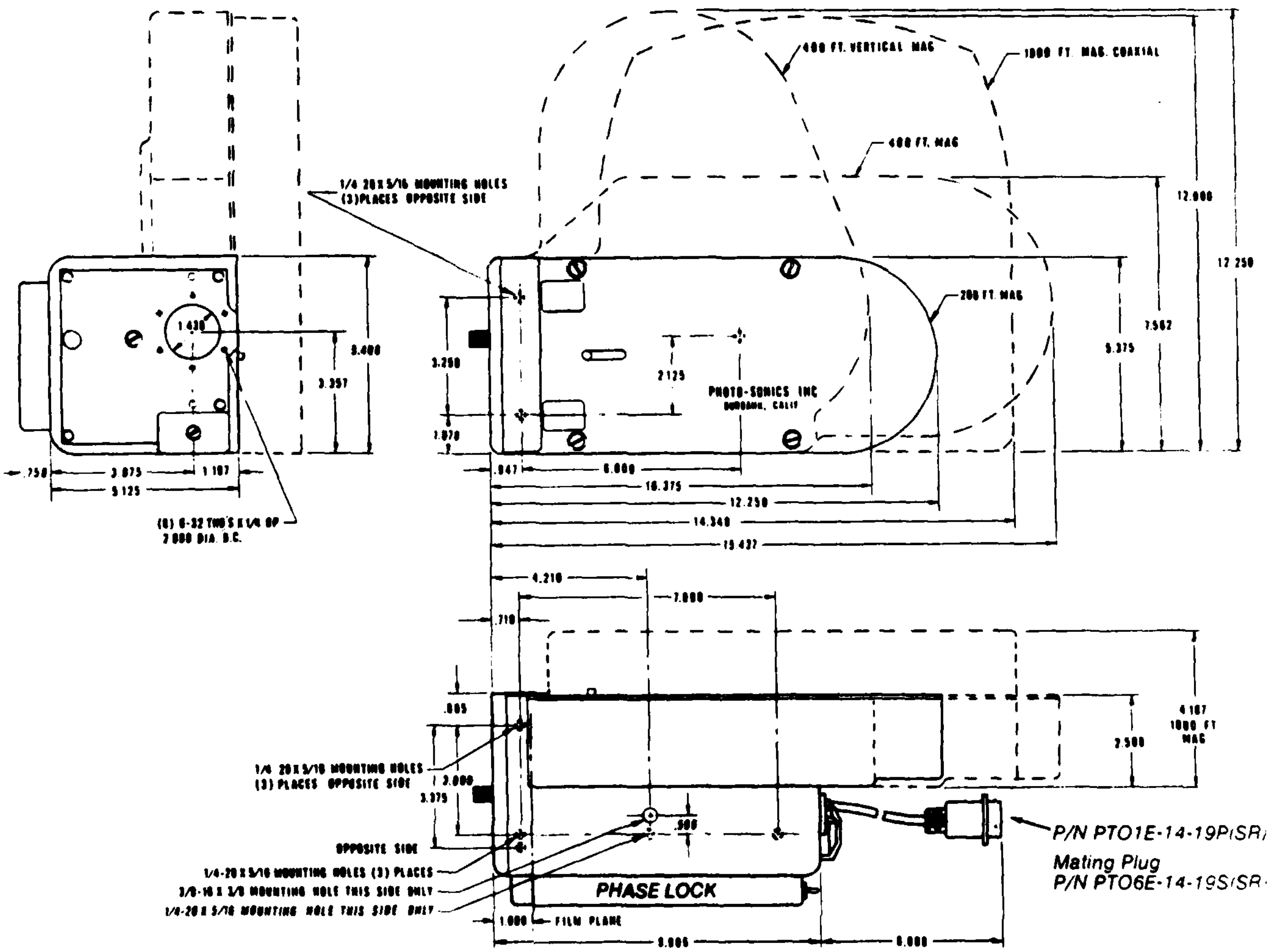
Mounting: Top, bottom, and right side of camera. When phase lock is used only top and bottom mounting are available.

Lens mount: Special bayonet Photo-Sonics interrupted thread (Nikkor mount optional at extra cost)

Heater: 115V AC or DC, 300 watts, thermostatically controlled.

Specifications subject to change without notice.

Outline drawing –



*Shaded area indicates phase lock synchronization

INSTRUMENTATION MARKETING CORP.

820 S. Mariposa St., Burbank, CA 91506/Phone 213-849-6251, Telex 67-3205

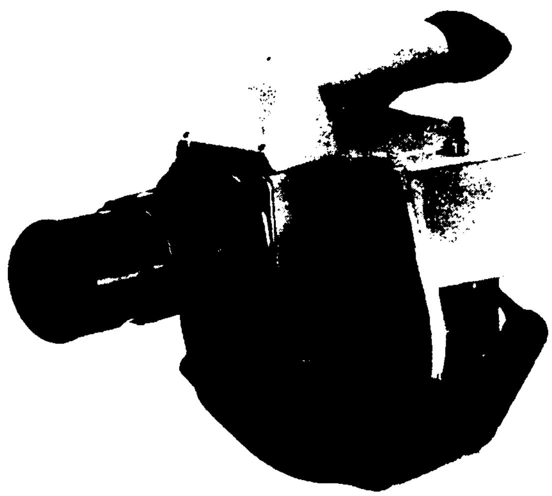
Product Bulletin

August 1981

NEW! Photo-Sonics hand-held 70mm Camera

FEATURES:

- Single frame pulse and up to 15 fps cine
- 100 foot daylight loading spools
- Self contained optional rechargeable power pack
- Variable shutter
- Five different viewing systems including continuous reflex viewing
- Uses modified ASNI Takumar lenses
- Modular construction for ease of configuration change
- One timing light, one index mark for mid point of shutter opening
- End of film cutoff switch
- Removable aperture plate for ease of cleaning



- Easy adjustment for speed control
- Automatic viewing iris control
- Accepts down to 35mm focal length lens

STANDARD CAMERA

The standard camera includes cine frame rates of 5, 10, 15 and pulse up to 5 per second maximum, variable shutter with 5 openings of 1/25, 1/50, 1/100, 1/200 and 1/400, two timing lights, shutter pulse (mid point) standard, nonreflex front end for modified Takumar lenses and standard door, operates on 28 VDC.

ACCESSORIES

Four front plates:
- Standard (as mentioned above)
- Flat plate for special lenses
- Beam splitter 25/75% for continuous reflex viewing
- Reflex mirror

Two camera doors
  With reflex optics and one with sports finder adaptor for field frames for 155mm, 200mm and 400mm with Calcite sight or cross sight

Two viewers
  Folding or Rigid

Two battery packs
  bolt on to the camera or battery belt and battery charger

Converter 115VAC to 28VDC

Handles with pulse/cine operation control

Switch blocks, for operation on tripod without handles

Lenses
  35mm f/4.5
  55mm f/3.5
  75mm f/4.5
  105mm f/2.4
  150mm f/2.8
  200mm f/4.0
  300mm f/4.0
  500mm f/5.6

PRELIMINARY INFORMATION SUBJECT TO CHANGE

TriTronics, Inc.
2921 W. ALAMEDA AVE., BURBANK, CA 91505
(213) 843-2170 / (213) 849-6115 L.A. LINE
TWX 9104984853 TRITRONIC BUBK
WATS LINE - TOLL FREE (800) 423-3640
CALIFORNIA - TOLL FREE (800) 232-2141

PCSM 6500

STOP MOTION — HIGH SPEED MONOCHROME TELEVISION CAMERA

The PCSM 6500 (The White Box) High Speed Phase Controlled Shutter Monochrome TV Camera is a black and white TV camera developed for near instantaneous image motion analysis. It removes the "blur" from each picture frame. It stops the motion of high speed objects to provide sharp, clear images. High speed gears, explosion effects, the muzzle velocity of a bullet, the speed of a missile or of a racing automobile can all be measured with precision from its high resolution stop-motion picture.

Tri Tronics' emphasis on engineering and quality control, ensure a highly reliable, stable, and durable television instrument which will provide years of service.

Specifically designed for continuous, reliable use, one basic camera provides a wide range of capabilities. Indoors or outside, under low light level and adverse conditions, this camera is outstanding in flexibility and performance. It is self-contained, lightweight, compact and provides a very wide range of automatic controls.

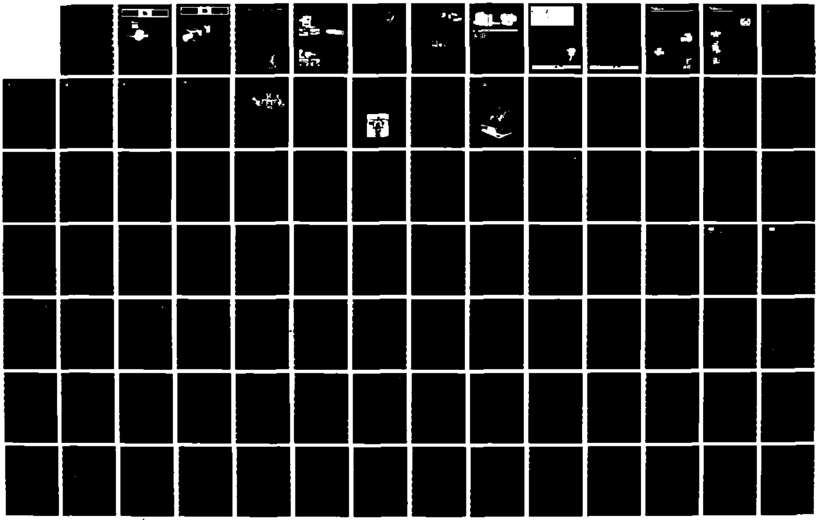
It has a very high resolution capability coupled with the high speed shutter action which allows picture definition that is absolutely superb. It is capable of multiple field rates to 300 fields/second.

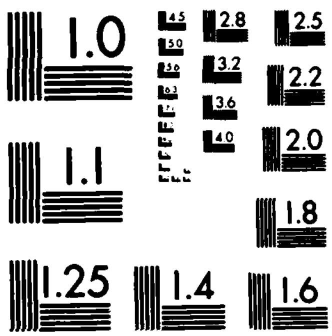
FEATURES:

- High Speed Rotary Shutter with 1/500th, 1/1,000th, 1/2,500th, 1/5,000th or 1/10,000th Second Exposure time.
- Multiple Field Exposures
- 1" High Resolution Sensors
- Continuous Exposure Capability
- Up to 800 Line Resolution
- Fully Automatic Operation
- Adjustable Vertical Phase
- Automatic Beam Control
- Variable Density Shade
- Lag Reduction Module (Option)
- Available in Vidicon, Newvicon, Saticon, Lead Oxide or Silicon Diode Versions
- Highlight Neutralizer
- Automatic Black Level

- Electronic Close-up (Newvicon Option)
- Internally Generated I.D. # (Option)
- Ruggedized Construction
- Automatic Gain Bandwidth
- Gen Lock Capability (Option)
- High Reliability
- Outstanding Stability

AD-A171 719 FULL-SCALE TRANSPORT CONTROLLED IMPACT DEMONSTRATION 4/5
PROGRAM PHOTOGRAPHIC..(U) JET PROPULSION LAB PASADENA
CA J D GREGOIRE APR 86 JPL-D-2534 DOT/FAA/CT-85/35
UNCLASSIFIED DTFA03-80-A-00215 F/G 14/5 NL

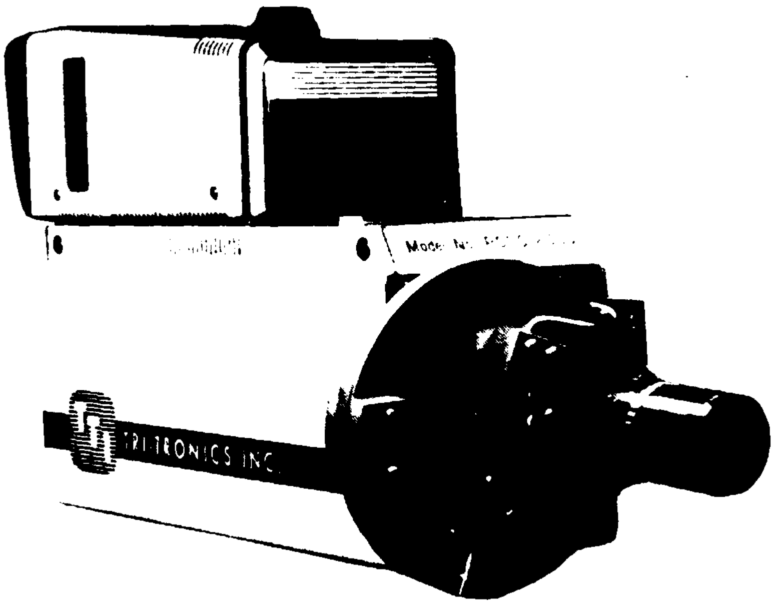




MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

TRITRONICS, INC.

PCSC-2300



HIGH SPEED PHASE CONTROLLED SHUTTER COLOR TELEVISION CAMERA

The PCSC 2300 high-speed phase controlled shutter Color TV Camera is the finest instrument yet developed for near instantaneous image motion analysis. The "blur" is gone! It stops the motion on high speed objects to provide sharp, clear images. The muzzle velocity of a bullet, the miss distance between a missile and its target, the speed of a racing automobile can all be measured with precision from its high quality picture.

Tri-Tronics Inc. emphasis on engineering and QC ensure a highly reliable, stable and durable TV camera which will provide years of service. The precision optical block has been specially designed to work with standard "C" mount lenses which provides for exceptional versatility.

A cleanly styled, compact piece of equipment with separated control unit, the PCSC 2300 is designed for closed circuit television use in military, industrial, scientific, educational, medical and security applications.

FEATURES:

- High Speed Rotary Shutter with 1/500th, 1/1,000th, 1/2,500th, 1/5,000th or 1/10,000th sec exposure
- Continuous Exposure Capability
- 2/3" Pick-up Tubes
- Two-piece Construction for Optimum Remote Control Functions in dangerous areas
- Bias Light Circuit for Low Light Level Applications
- Accepts Standard "C" Mount 1" Format Lenses
- Automatic Black & White Balance
- Built-In Test Pattern
- Built-In NTSC I & Q Encoder
- Internal or External Sync Capability
- Built-In Horizontal Detail Enhancer with Optional Vertical Detail Module available
- Switchable +6DB gain for low light levels
- Optional 5" Viewfinder
- Adjustable H & V Blanking Width
- Built-In Color Bar & Test Signal Generators
- RGB & NTSC Outputs
- Long Distance Cable Compensation to 1,000'
- Internal Capping Shutter
- Auto Iris Circuits for Optimum exposure
- H & V Shading Controls

CONTACT
TTI SALES & SERVICE

TRITRONICS, INC.
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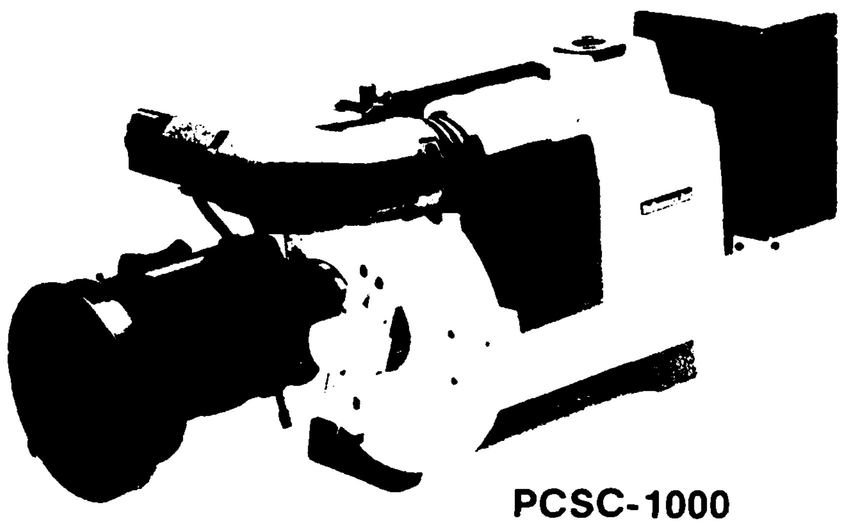
TWX 9104984853 TRITRONIC BUBK
WATS LINE TOLL FREE (800) 423 3640
CALIFORNIA TOLL FREE (800) 232 2141

PCSC-1000

PORTABLE HIGH SPEED STOP MOTION COLOR VIDEO CAMERA



PCSC-1000

"THE BLUR IS GONE" WITH SHUTTER SPEEDS FROM 1/60 SEC TO 1/10,000 SEC

A Super-Compact Three-Tube Camera. Designed Without Compromising Quality!

The PCSC-1000 High Speed Phase Controlled Shutter Color Video Camera has been developed for near Instantaneous Image Motion Analysis. It removes the "BLUR" from each picture frame. It stops the motion of high speed objects to provide sharp, clear images. High RPM gears, explosion effects, the muzzle velocity of a Howitzer, the speed of a missile or a racing automobile can all be measured with precision from its high resolution stop motion picture.

Designed for hand-held or portable operation, this rugged environmentally designed camera can be used on railroad engines, power boats, helicopters or in any other hard to reach difficult environment. Underwater, explosion-proof and extreme environmental housings are available. Specifically engineered for continuous, reliable use, one basic camera provides a wide range of capabilities. Indoors or outside, under low light level and adverse conditions, this camera is outstanding in flexibility and performance. It is self-contained, light weight, compact and provides a wide range of automatic controls.

FEATURES

- Super-compact professional quality color video camera
- Power consumption only 17W (with viewfinder)
- Three 2/3" (17.7 mm) Saticon tubes newly designed for quick warm-up convenience
- High-performance parallel optical system with multi-layer coated lenses and dichroic mirrors
- Rugged construction with diecast aluminum frame
- High signal-to-noise ratio of 52 dB plus 9 dB GAIN available for really low light situations
- C-mount and special lens mount enable using a 200 – 2000 mm lens for 35-mm still cameras by employing an adapter ring
- Plug-in circuit board construction for easy serviceability
- Built-in genlock circuit and color bar generator
- Higher portability with provided battery and AC adapter (also used as a quick charger)
- Studio setup also is made possible with the optional TTI VF-2500BU 5 viewfinder, RS-1900U Remote Control Unit, and specified cables
- 6:1 zoom lens with auto iris, 10:1 servo zoom lens, or 14:1 servo zoom lens can be used
- Automatic iris control with weighting detection circuit to reduce the sensitivity for the upper part of the frame
- ABC (Automatic Beam Control), knee compression and white clip circuits for highlight processing
- Y, I & Q encoder provided
- R, G and B output signals through the optional RS-1900U
- Automatic white balance control circuit with 8-bit digital memory

Model 525-versatility in Infrared Imaging

TV compatible, compact and field portable, the Inframetrics Model 525 Imaging Radiometer System adapts efficiently and easily to a virtually limitless variety of thermography applications. The basis for the design is the patented combination of a two mirror, low inertia electro-mechanical scanning system (illustrated on back page) that operates in conjunction with unique formatting circuits.

Together, they produce a standard TV output signal in real time.

Unequalled characteristics

Considering the high performance achieved, the approach has no equal in:
- real time flicker-free image,
- basic ruggedness and maintenance-free reliability,
- electronic simplicity for video formatted to RS-330 specifications,
- small size and weight,
- low power consumption,
- high optical throughput,
- uniformity across both the full infrared spectrum and the field of view,
- high scan efficiency, and
- low cost.

Picture quality and resolution

The scanner in conjunction with a liquid nitrogen cooled HgCdTe detector easily places the system at the top of commercially available high resolution real time imaging radiometers. In the 8 - 12 μm spectral region for which the system is optimized, there are nominally 30,000 picture elements (pixels) per frame, with a minimum detectable temperature of 0.1°C for large targets.

Quantitative data analysis

All of the standard operating modes of the Model 525 are shown on this page. All modes are quantitative. Even in the normal imaging mode both a marker to identify the temperature range, and a calibrated grey scale in degrees per unit length are displayed, along with the thermogram. In combination, they permit quantitative data analysis through interpretation of the grey tones.

Measurement

A "chopper" within the scanner provides a radiance reference for the system. The detector output level is set with this reference 60 times per second during flyback of the vertical scan mirror. This standard feature controls system drift that would otherwise be present when temperature difference measurements are made in the presence of a changing background temperature. A level compensator option uses the temperature of the chopper in conjunction with a Programmable Read Only Memory (PROM) and an enumerated level control to additionally compensate for varying ambient temperatures.

Standard TV output signal

The versatility of the system is enhanced by the many electronic, optical, mechanical and photographic accessories available as standard options. However, the most significant feature of all is the standard real time TV output signal. With it, the system interfaces directly with commercially available videocassette recorders (VCRs), video monitors including ordinary television sets, and many other standard TV data processing and analysis devices.

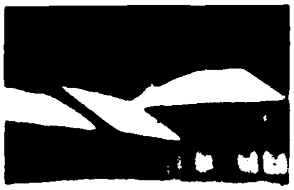
Dynamic data recording

The VCR in particular is unequalled as a medium for low cost, high density data storage. Details of thermal patterns extending over large areas can be recorded as the scanner is rapidly panned. The standard system records transient events in sampling periods of some 17 ms, and with the 8KHz line scan option, high speed events can be recorded and analyzed in time intervals as small as 125 microseconds.

Many of the commercially available VCRs utilize automatic gain control and level setting; some can record with a dynamic range approaching 45 db. Recognizing this, black-and-white reference signals are included as part of the TV output signal from the Model 525. The Inframetrics colorizing system uses these references to reset the video for quantitative analysis on playback, and the same references can easily be used in playback analysis with a special or general purpose computer, such as the IVS-200 System.

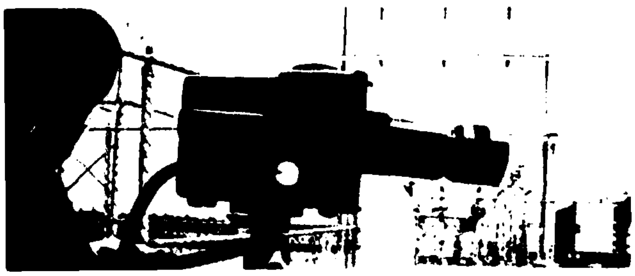
0.4X Expander Lens (Wide Angle)

The germanium expander lens increases the system FOV and resolution element size by a factor of approximately 2.5, to provide a maximum horizontal FOV of 45°. (Narrowband filters should be used at wavelengths below 4.5 micrometers.)



3X Telescope

The afocal telescope uses four germanium optical elements and reduces the system FOV and resolution element size by a factor of 3. Since it is an inverting telescope, a microswitch is automatically activated to reinvert the image and correct for optical transmission changes. This switch is a scanner modification included with the lens, and is made at the factory. *This lens is required for use with all Close-up Lenses.*



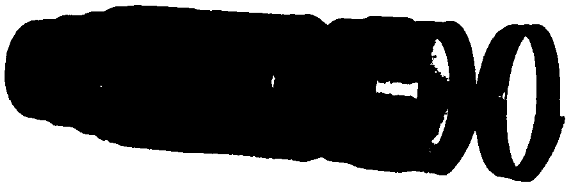
Close-up/Microscope Lenses

It is possible to focus the basic scanner to very close distances for viewing small target detail. However, a microscope lens and six close-up lenses are offered which are individually coupled to the 3X telescope for high resolution imaging at working distances from 0.35 to 96 inches (9.0 to 2438mm). With the electro-optical zoom - a standard feature on Models 525 and 210 - the corresponding image size of each lens may be enlarged by up to four times.

Both the microscope and 6-inch lenses should be used with narrow-band filters for wavelengths below 4.5 micrometers to optimize focus in the presence of chromatic aberration.

A right angle configuration is available for the microscope lens upon special order.

All of the supplementary lenses are compatible with Models 210 and 520, as well as the 525.



Ordering Information

AC 002 0.4X Expander Lens 45° germanium wide angle lens. Provides FOV of 45° x 35°. Lens case included.

AC 004 3X Telescope The afocal telescope for model 525 (8-12μm). with telescope inverting switch (AC 038) installed in the scanner head, and with lens case.

AC 004W 3X Telescope As above, for Model 210 and broadband 525 (3-12μm).

AC 013 10X Telescope Designed to operate within the 3-12μm band. Scanner interfacing modifications are included. Rugged shipping case. Compatible with models 525 and 210 only.

AC 038 Telescope Inverting Switch This switch, when installed at time of purchase, allows the 3X telescope to be added later without returning the system to the factory for modification. It is included as a part of items AC 004 and AC004W. *For level compensated instruments additional factory calibration is required for 3X telescope.*

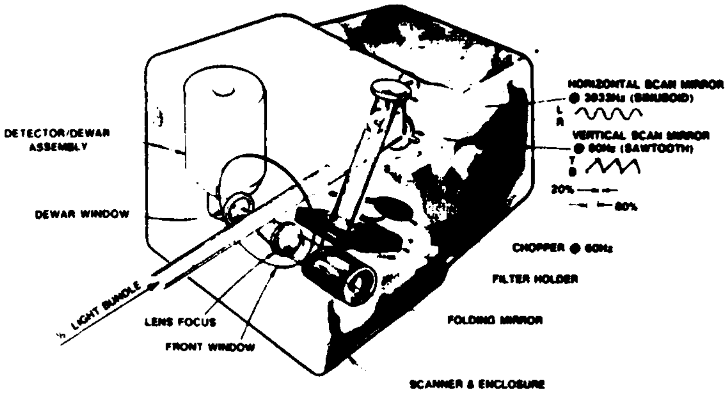
AC 048 90-Degree Image Rotator Attaches to the front of the scanner window to rotate the image by 90 degrees. This adds a vertical line scan capability to the standard horizontal line scan feature. For Models 525 and 210 only.

AC 089 Downlooker A front surface mirror attaches to the scanner window at 45 degrees and turns the field of view 90 degrees.

Optical Schematic

Our unique, patented scanning system achieves a new level of compactness and reliability. Resonant galvanometer scanning in the horizontal direction avoids the cost of high speed rotating assemblies, reduces power requirements and produces a high scan efficiency. For a given FOV, this means that detector dwell time is increased so that good sensitivity is attained with simple detectors that are inexpensive and producible.

INFRAMETRICS MODEL 525



Specifications

	Model 525
Temperature Measurement Range	-20°C to +1300°C
Min. Detectable Temp. Difference (MDT)@ 30°C amb	0.1°C
Field of View, Typical (Vert x Horiz)	14° x 18°
E-O Zoom Range	4:1
Instantaneous Field of View (IFOV)	2mr
Operating Temp. Range	-20°C to +50°C
Temperature Ranges	10, 20, 50, 100, 200, 500, 1300°C
Isotherm Function	All temp ranges
Line Scan Function	All temp ranges
Frame Rate*	30Hz/2:1 Interlace
Line Frequency (T.V. Rate)	15,750Hz
Spectral Range, Nominal	8-12 µm (options: 2-12 or 3-5)
Dynamic Range	6 bit (option: 8 bit)
Detector	HgCdTe
Resolvable Elements per line, Limiting	250 —
Lines Per Frame (525 raster)*	200 IR lines
Focus Range	5" to infinity
Detector Coolant	Liquid nitrogen —
Coolant Hold Time	>2 hrs.
Power Requirements*	12 volt battery or 110 VAC, 60Hz
IR Scanner Size (HxWxL)	8" x 4-1/2" x 8-1/4"
Control/Electronics Size (HxWxL)	5-1/2" x 8-1/2" x 8-1/2"
IR Scanner Weight	4 lbs.
Control/Electronics Weight	8-1/2 lbs.

* 625 line with 220v @ 50 Hz available

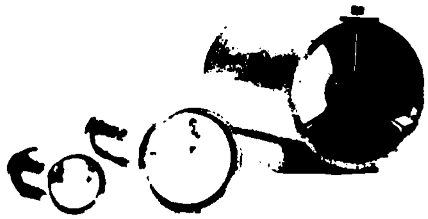
Unique design ▪ Compact ▪ Reliable ▪ Cost effective

A new night vision system for all FLIR applications...

Producing high quality images day or night, the IRTV-445 is an advancement of the technology currently used in the imaging radiometers produced by Inframetrics. The IRTV-445 exploits the advantages of far infrared radiation to provide real time television images in absolute darkness, to penetrate smoke, haze and shadow and to present resolution comparable to visual television. Much greater target recognition ranges than image intensifiers and low light television systems are attainable, as well as immunity to blooming caused by the sun, flares or searchlights.

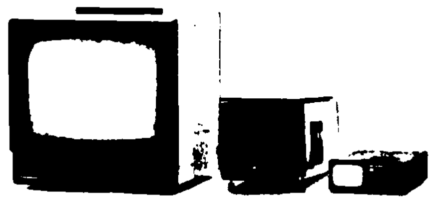
The heart of the IRTV-445 is our unique, patented scanning system that achieves a new level of compactness and reliability in thermal imaging systems. Resonant galvanometer scanning in the horizontal direction avoids the cost of high speed rotating assemblies, reduces power requirements and produces a scan efficiency in excess of 92 percent. For a given FOV this means that detector dwell time is increased so that good sensitivity is attained with simple detectors that are inexpensive and produceable.

A 4:1 electro optical zoom is also implemented by electronically controlling mirror scan angles. Zooming provides a larger display image of a narrower field, improving the probability of target detection and recognition. The control unit allows the operator to optimize the picture under a wide variety of scene conditions.



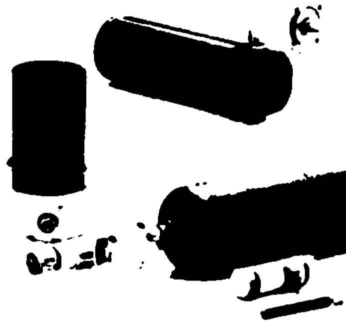
LENSES

While the scanner alone may be used for imaging, collimated beam scanning also allows a variety of afocal telescopes to be used. Inframetrics currently offers both reflective and refractive designs covering spectral regions from 2 to 14 microns. System focus with any telescope is optimized electronically with a front panel focus switch. Magnifications up to 15X are available, as are custom lens designs for special applications. An electrically-switchable unit with dual-magnification can be had on special order.



MONITORS

Conforming to the requirements of closed circuit television transmissions, the RS-330 B&W output is directly compatible with many different displays, from low cost commercial receivers to high performance mil spec monitors. Typical display sizes range from one to 14 inches, and may be viewed directly, or through monocular or binocular lenses. Colored phosphors to preserve night adaptation are also available.



COOLING

Several options for cooling the detector to 77°K are available. A built-in dewar for liquid nitrogen will yield operating times from one to four hours; a demand flow J-T cryostat will provide up to four hours of operation; a closed cycle refrigerator can be used; other reservoirs may be employed.

Consultation with our engineering staff is recommended. Detailed literature, service backup and training are available.

SPECIFICATIONS

Scanner FOV	28° H x 21° V
Electro Optical Zoom	4:1
IFOV	2.0 mR
System f-number	1.(
Entrance Pupil	0.5 in
Spectral Bandpass	8 - 12μ
Detector	HgCdTe
N.E.T.	(typ.) 0.2°C
M.R.T. typ @ 0.25 cy/mR	(norm.) 0.5°C
	(max. zoom) 0.2°C
M.D.T.	(typ.) 0.1°C
Limiting Resolution	400 el. lines
Active IR lines	445 frame
Active TV lines	445 frame
Video Output — EIA Std RS-330	525L frame
Frame Rate	30Hz
System Input Power	<15W @ 12VDC
Operating Temperature	-20° to +55°C
Humidity	0 to 99% @ 25°C
System Weights:	
Scanner	4.4 lbs
Electronics	3.0 lbs
Control Panel	1.0 lb

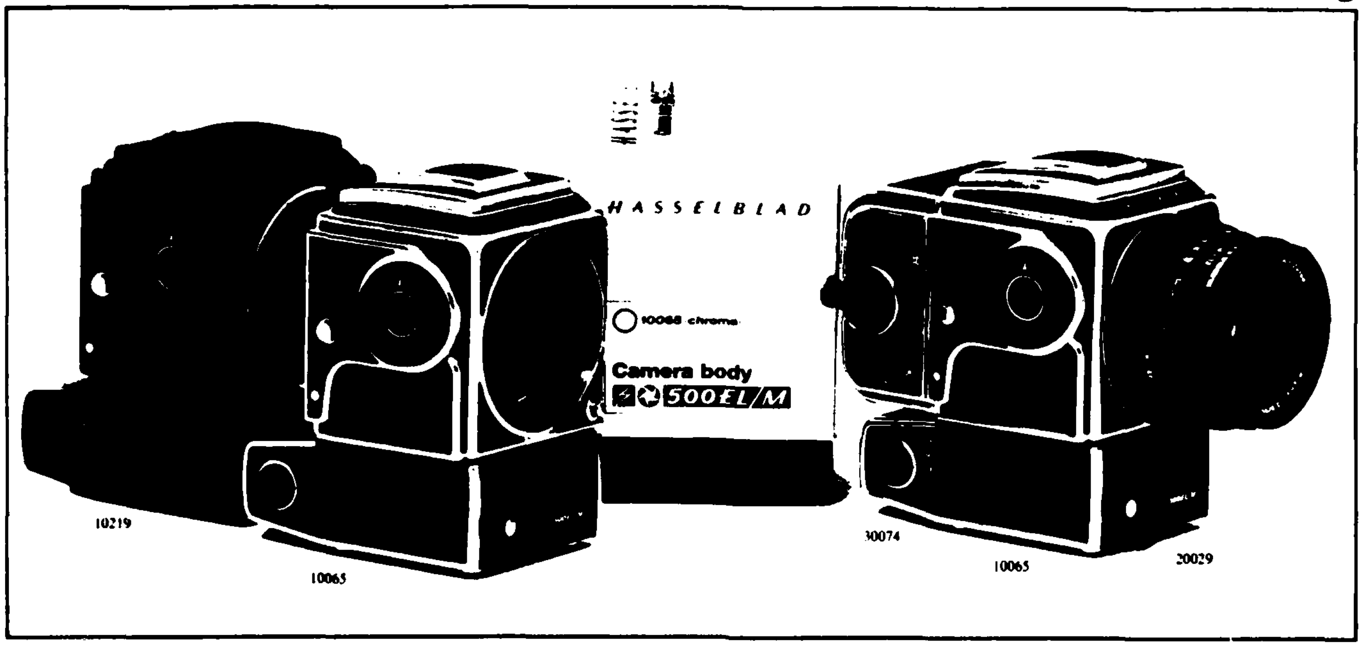
OPTIONS

Telescopes 4X 8X 10X 15X
28 VDC Power Supply
Video Output CCIR 625 line 50 Hz
Digital Video Output
Dual Spectrum 8-12 and 3-5 μ
Cooling Liquid Nitrogen
Demand Flow J-T Cryostat
CM5 Split Sterling Refrigerator

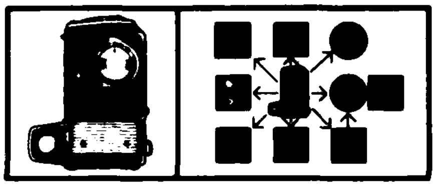
ACCESSORIES

TV Monitors
Gas Fill Station
"TOW" Gas Bottles
Batteries
Transport Cases

The Infrared Specialists **inframetrics**
25 Wiggins Avenue, Bedford, MA 01730 • (617) 275-8990
Offices around the world TWX 710-326-0659



Hasselblad 500EL/M



The Hasselblad 500EL/M is the motorized camera in the system. It is a single-lens reflex camera with a built-in motor. The film is automatically advanced, the shutter cocked, the mirror flipped down, and the mirror image restored after each exposure. This expands the photographer's creative freedom, since the 500EL/M enables him to devote all his attention to his subject. An efficient camera capable of sequential exposures at the rate of about 70 frames a minute and designed for convenient remote control operation. The obvious choice for portrait, fashion, advertising, sports, and wildlife photography. An obvious choice even for industrial, scientific, and security applications. The camera body, an interchangeable lens, and a film magazine jointly form a complete camera. These main components are now only sold separately.

The Hasselblad 500EL/M camera body accepts interchangeable viewfinders and focusing screens and has a built-in system to prevent unintentional double exposure. There is an accessory rail and release sockets for attachment of special accessories on the camera body. The motor is powered by one or two rechargeable batteries, each of which good for about 1,000 exposures. A battery and recharger are included. A tripod plate with a ¼" tripod thread facilitates attachment of the camera to a tripod.

HASSELBLAD 500EL/M CAMERA BODY

The camera body is available with chrome or black trim and is supplied without a lens or film magazine. Weight: 2 lb 8 oz (1140 g) incl. one battery.

10065 500EL/M camera body, chrome, is supplied with the following equipment:

42021 Standard focusing hood, chrome
42161 Standard focusing screen
56022 Recharge unit
56081 Battery (1)
51438 Front protective cover
51063 Rear protective cover
46140 Carrying strap
56111 Fuses (2)
46159 Key disc
46175 Socket cap
46116 Release button
46043 Release cord FK 30

10219 500EL/M camera body, black, is supplied with the same equipment as the 10065 above but with a black-trim version of the standard focusing hood 42277.

Compose a Hasselblad 500EL/M to fit your photographic needs. The camera accepts the following items, which are described in greater detail under their respective headings and symbols.

CF LENSES

20177 30mm Distagon CF f/3.5
20037 40mm Distagon CF f/4
20045 50mm Distagon CF f/4
20207 60mm Distagon CF f/3.5
20029 80mm Planar CF f/2.8
20126 100mm Planar CF f/3.5
20134 105mm UV-Sonnar CF f/4.3
20053 120mm Makro-Planar CF f/4
20118 135mm Makro-Planar CF f/5.6
20061 150mm Sonnar CF f/4
20080 250mm Sonnar CF f/5.6
20193 250mm Sonnar CF Superachromat f/5.6
20185 350mm Tele-Tessar CF f/5.6
20088 500mm Tele-Apotessar CF f/8

C LENSES

All Hasselblad C lenses fit the 500EL/M (see p. 10). (C lenses will ultimately be phased out.)

FILM MAGAZINES

30074 Film magazine A12 (chrome)
30147 Film magazine A12 (black)
30082 Film magazine A16 (chrome)
30155 Film magazine A16 (black)
30090 Film magazine A16S (chrome)
30163 Film magazine A16S (black)
30104 Film magazine , W-22 ome)
30171 Film magazine A24 (black)
30066 Film magazine 70 (chrome)
30139 Film magazine 70 (black)
30201 Film magazine 70/100–200 (chrome)
30228 Film magazine 70/100–200 (black)
30198 Magazine 100 for Polaroid film
41017 Sheet film adapter

VIEWFINDERS AND FOCUSING SCREENS

42293 Meter prism finder PME
42307 Prism viewfinder PM
52028 Prism viewfinder NC-2/100
52086 Reflex viewfinder RM
52094 Magnifying hood
42188 Focusing screen with split-image rangefinder
42234 Focusing screen with central grid
42218 Focusing screen with central grid and split-image rangefinder
42250 Checked focusing screen with central grid
42285 Fine-line focusing screen
42200 Plain glass screen

GRIPS, HOLDERS, AND STRAPS

46329 Flashgun bracket for 500EL/M
46221 Pistol grip for 500EL/M
46132 Double handgrip for 500EL/M
45128 Tripod quick-coupling
59080 Wide camera strap

CLOSE-UP AND COPYING ACCESSORIES

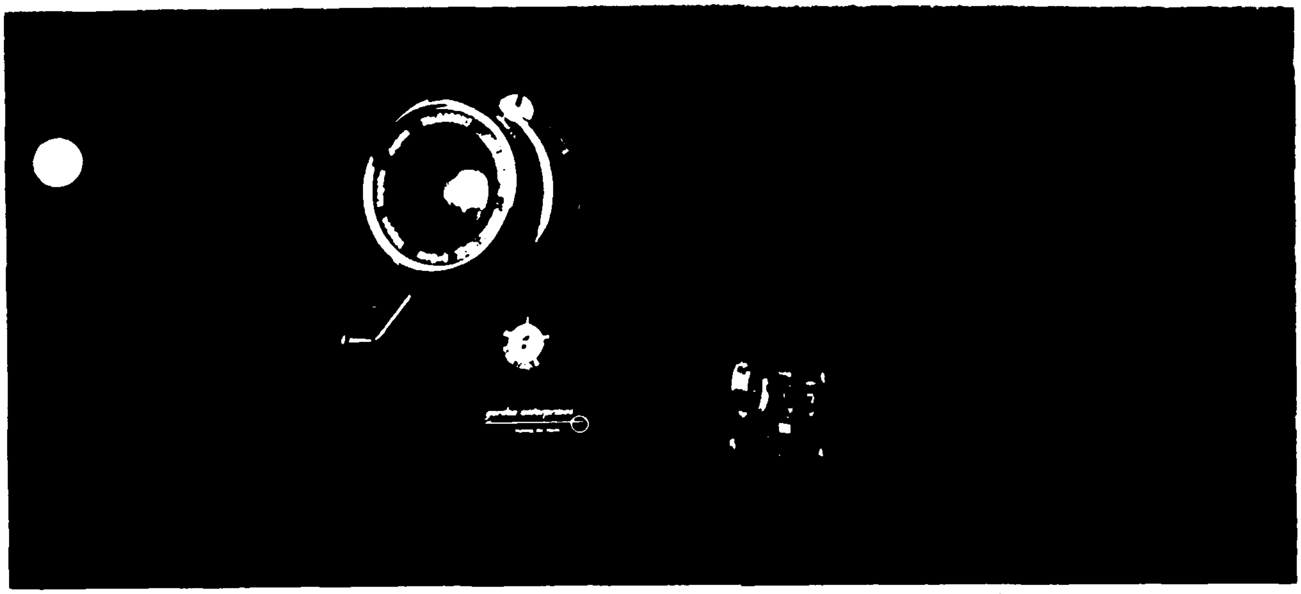
40517 Automatic bellows extension
40649 Extension tube 8
40541 Extension tube 16
40568 Extension tube 32
40657 Extension tube 56
51657 Macro flash bracket, Ø 50–Ø 70
40185 Linear mirror unit
40045 Microscope adapter

SPECIAL ACCESSORIES FOR THE 500EL/M

56103 Recharge unit III
46337 Battery compartment 3
46302/46310 Power supply unit
46272 Intervalometer III
56138 Command unit
Connecting cords
Release cords

MISCELLANEOUS ACCESSORIES

43028 Sports viewfinder
43125 Adjustable flash-shoe
43117 Spirit level



HULCHER 35mm SEQUENCE CAMERA

The new Hulcher Model 35-1 is a rapid sequence double-frame 35mm camera developed in response to requests from photographers in industry, science, and the press. It is now available exclusively from Gordon Enterprises in the Western U.S.

The Model 35-1 is a small, lightweight camera, extremely versatile with frame rates, film supply and shutter settings far beyond those of any other camera in its field. It will operate at frame rates from 5 to 20 per second, and will take up to 800 pictures without stopping. The 35-1 provides shutter settings from 1/25 to 1/4000 second. It will accept all of the Nikkor lenses, or may be provided with adapters for other popular 35mm type lenses.

Full reflex focusing, with field lens and magnifying lens is standard equipment. The sports type finder is standard *equipment and, on special order, a trigger* switch handle which electrically retracts the mirror when the camera is operating and replaces it automatically after each burst has been fired.

The Hulcher 35-1 operates from a small sealed nickel-cadmium battery, and will take thousands of pictures without recharging.

The shutter is a rotary disc type, operating close to the focal plane. It employs a system of milled slots for high accuracy at the fast shutter speeds.

The camera is constructed almost entirely of aluminum alloy. All bearings are either sealed ball bearings or oilless type. The film transporting system uses no reciprocating parts and very little *maintenance* is *required*.

SPECIFICATIONS

FRAME SIZE – 3-1/32" x 1-15/32" (double 35mm)

FRAME RATES – Standard cameras incorporate switch for selecting either 5 and 10 fps or 15 and 20 fps. Please specify when ordering. An infinitely variable speed control is available on special order.

FILM CAPACITY – 100' 35mm perforated film. Available in almost any desired emulsion in black and white or color.

FOCUSING – Full view reflex focusing (inverted image) with magnifier and field lens built in.

FILM THREADING – Uses 100' rolls of film spooled on No. 10 daylight loading type spools. An indicator mounted on the bottom side of the camera indicates the amount of film left on the supply spool at all times.

CAMERA WEIGHT – Less lens and film, approximately 4¾ pounds.

CAMERA SIZE – Overall width 8¾ inches, depth less lens 6½ inches, overall height, less sports finder 4¾ inches.

POWER REQUIREMENTS – The camera operates from a 12 volt battery supply. A small 12 volt sealed Nickel Cadmium Battery is available for use with the camera. A power rectifier for operation of the camera from 115 volt AC is available.

SHUTTER SETTINGS – Nine separate shutter speeds for each frame rate ranging from 1/25 of a second, minimum at 5 frames per second up to 1/4000 of a second at 20 frames per second.

SHUT SET	5 FPS	10 FPS	15 FPS	20 FPS
1	1000	2000	3000	4000
2	750	1500	2250	3000
3	500	1000	1500	2000
4	375	750	1125	1500
5	250	500	750	1000
6	125	250	375	500
7	50	100	150	200
8	25	50	75	100

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MOTION PICTURE CAMERAS AND ACCESSORIES

GE-35594-1	Porta-Dolly
GE-47178-2	[illegible] Carrying Cases
GE-46158-3	The Carter Carpac
GE-46158-4	O'Connor Fluid Camera Head — Type 200-B
GE-35716-1	Houston Fearless Friction Head
GE-46392-4	Kenyon Gyro Stabilizer — Models KS-4, KS-6
GE-35594-2	NCE Hydrofluid Tripod
GE-1104-1	NEW the Caron AC Power Generator
GE-46885-1	Eclair Camera 16mm NPR
GE-[illegible]-4	Fisher Microphone Boom
GE-46885-4	CINE 60 Sound Blimp
GE-46081-4	A 500 Luminance Analyzer
GE-46236-1	Bell & Howell Tracking Finder
GE-46081-3	Lowel Light Vari-Flector
GE-46885-2	Angenieux Zoom Lenses
GE-5DF	Gordon-Bell Camera Helmets
GE-35716-4	Frezzolini Model 30-D Power Supply
GE-47178-3	Topaz Powermaker
GE-47178-1	Specto Motion Analysis Projector
GE-5416-1	Graph Check Sequence Camera
GE-V11-4	Video Tape Recording

AERIAL PHOTOGRAPHIC AND PHOTOGRAMMETRIC EQUIPMENT

GE-34[illegible]-6	K-37 Aircraft Camera
K-2	Aircraft Camera, Type K-20
GE-34[illegible]-1	CA-6a Aerial Camera, CA-7c Aerial Camera U.S. Navy Bureau of Aeronautics PH-110
GE-46885-3	K-17 Aerial Cameras
GE-46392-1	Model 462-GE 35mm Pulse Recording Camera
GE-45066-3	Type N-9 Motion Picture Camera
"200"	16mm High Speed Camera
GE-37904	Camera Recording Type 57GE
GE-46236-4	AN-N6 and AN-N6A GSAP Camera
GE-61-43085	Radar Recording Camera — Type O-15
GE-47290-1	Aerial Photo Dot Counter
GE-35149-2	90° Erector Assembly for the N-9 GSAP Camera Specification Mil E-9403
GE-43997-2	"V"-Angle Optical Theodolite Film Comparator
GE-35149-1	Focalscope Aerial Camera Autocollimator Specification Mil-F-9189
GE-35746-1	Intervalometer, Type B-3B
GE-36418-2	Intervalometer, Gordent Type 15A
GE-34933-7	Type A-30 Remote Controlled Mount
GE-34933-4	Steinheil Optical Gyro-Stabilized Mount
GE-42109-2	Camera Mount, Vertical Type NR-1A
GE-46392-2	Camera Tracking Mount — Type 249-GE
GE-42374-60	Stabilized Vertical Camera Mount — Type A-28
GE-35148-3	Type 76 GE mount
GE-46081-1	Measuring Magnifier — Type 376-GE
GE-34933-1	Type C-1 Pilot Director (Solar Photographic Specification No. 75-275
GE-46714	Simpson Point Selector
GE-44741-4	Vertical Sketchmaster — Type 260GE
GE-46081-2	Oblique Sketchmaster — Model 454-GE
LM-9	"Hands Off" Mapping with the Shoran/Straight Line Indicator, Type LM-9
A-28	A-28 Gyro Stabilized Vertical Camera Mount
GE-46158-2	Slotted Templet Cutter, Type 111-GE
GE-43562-4	Slotted Templet Set, Type 116-GE
GE-35746-2	Steroscope, Mirror, Type F-71
GE-61-43805	Stereocomparagraph, Type 121-GE
GE-43997-1	Sterometer Parallax Bar — Type 122-GE
GE-46236-3	Pocket Stereoscopes, Type 214-GE
GE-61-43805	Photographic Negative Identification, Stamping Machine
214-GE	Stereo-Plotting Instruments
GE-42121-4	Type An-1 (10GE) Boresight Kit
A/C 5362	Summary of Data on Aircraft Camera and installations

AERIAL AND MOTION PICTURE FILM PROCESSING EQUIPMENT

GE-46714-3	Portable Film Developers — Type B-5A
GE-46392-3	Aerial Roll Film Dryer — Type A-10A
GE-42109-1	Type A-10 Roll Film Dryer
GE-42224-1	Type EL-1 Film Dryer
GE-44741-2	Milli-Mite Timing Light Generator
GE-46236-2	Mobile Photo Lab
GE-35716-2	Maurer-Matic Portable Film Processor
GE-47290-2	10-C Automatic Film Processor
GE-35149-3	70mm Contact Printer
GE-36418-1	Printer, Continuous, Type CAI W-10
GE-34905-1	Printer, Contact, Aerial Type A-11A
GE-46236-1	Printer, Contact, Aerial Type A-11B
GE-35746-3	Printer, Contact, Aerial Type A-10
GE-46158-1	Automatic Film Processor — Type A-11
GE-42374-60	A-9 Automatic Film and Paper Processor
GE-35594-3	Unicorn Automatic Film Splicer
GE-47178-4	Maier-Hancock Portable Hot Splicers
GE-46714-1	Guillotine Perforating Film Splicer
GE-44741-3	Acmade 16/35mm Foot-Operated Splicer
GE-46714-2	Permacel Film Processing Splicer, Model #9100
GE-44741-1	Acmade Mark-II Film Editing Table

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Nikon

A Tradition of Excellence

A distinctive combination of innovative design and manufacturing precision serves as the hallmark of Nikon photographic and optical instruments. Nikon pioneers when there is pioneering to be done—Nikon cameras have accompanied American astronauts to the moon and will be the only cameras aboard the upcoming Space-Shuttle flights—yet, the traditions of careful research, gradual evolution and quality-control manufacturing are never abandoned.

The Nikon and Nikkormat cameras are the heart of the internationally famous Nikon System. More than 55 Nikkor lenses serve as its eyes. Add over 250 available accessories and you have the foremost and most versatile photographic system available today—ready to respond to any photographic need.

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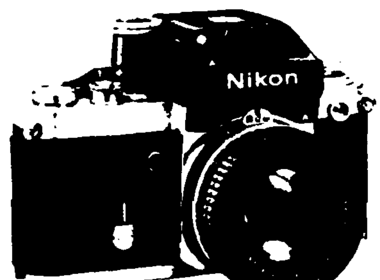
For the ultimate combination—concept plus quality—the choice is obvious. Nikon—the finest.

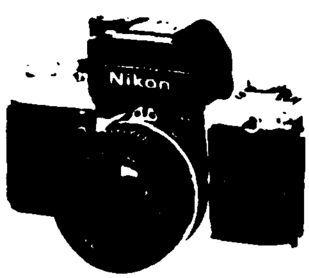
Nikon Cameras

Nikon F2A Photomic



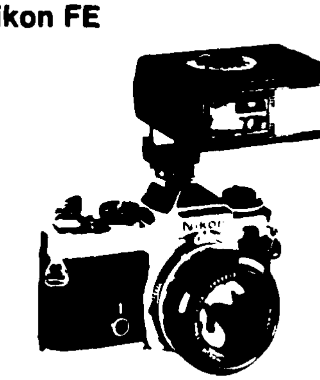
The latest model of the camera that has become "the professional's choice" the world over. Highlights include: Automatic indexing of maximum lens aperture *(AI) and aperture direct readout* (ADR) with Nikkor AI lenses; a CdS, center-weighted, through-the-lens meter (EV 1~17) three-way focusing screen (K screen) with central split-image rangefinder, surrounding microprism ring, and matte Fresnel field, an embossed titanium-foil, horizontal-travel shutter with speeds of "B" and from 1 to 1/2000 second and continuously variable settings from 1/80 second and faster; settings of 2 to 10 seconds possible via built-in self timer. X-synchronization at up to 1/80 second; a short-stroke film advance that also activates the meter; a hinged, removable back; an extra-large mirror that eliminates image *cutoff with long lenses; f/stop and* shutter-speed display in the viewfinder, and depth-of-field preview. More than 55 precision Nikkor lenses are available. 6 interchangeable finders and 20 finder screens are accepted, full motor drive and 250- or 750-exposure capability. (The camera body is also supplied with an eyelevel prism without metering as the Nikon F2.)

Nikon F2AS Photomic



This offers the operational features of the Nikon F2A *plus* a highly sensitive (EV −2 to +17) silicon-photo-diode (SPD) meter and fully automatic exposure when used with the accessory EE Control Unit (DS-12) which adjusts the lens aperture. The wide metering range allows for readings and auto control in light so dim than an exposure of 8 seconds at f/1.4 (ASA 100) would be necessary. A five stage LED readout signals correct exposure as well as under- and over-exposure of 1/5 to 1 stop and more than 1 stop. A single diode on top of the prism signals correct exposure. The F2AS Meter/Finder and Servo EE Control Unit are self-contained requiring no separate battery packs. Remote operation is the obvious application but the entire unit is compact enough to serve as an automatic hand camera. The camera can also be used without the EE Control Unit for conventional photography.

Nikon FE



The compact Nikon FE offers reduced size and weight *plus* automatic exposure control via a highly sensitive silicon photo diode (SPD) meter and electronically controlled shutter. The fixed viewfinder comes equipped with the standard Nikon K screen but 2 other interchangeable screens (B and E) are available for specialized applications. Aperture and shutter speed appear *in the viewfinder. A specially designed electronic flash unit* (SB-10) *carries* automation into the *area of* flash photography. The Nikon FE accepts the compact MD-11 Motor Drive Unit for single-frame or continuous shooting at rates up to 3.5 frames per second. Other features include a metal, focal-plane, vertical-travel shutter with electronic control in automatic mode and 14 settable speeds from 8 to 1/1000 second in manual mode, automatic X-synchronization at 1/90th second with the SB-10 flash or at speeds up to 1/125 second manually set, self timer, depth-of-field preview, interchangeability of Nikkor lenses from 6mm to 2000mm, short-stroke film advance, and built-in hot shoe.

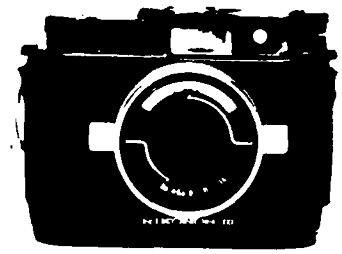
Nikon

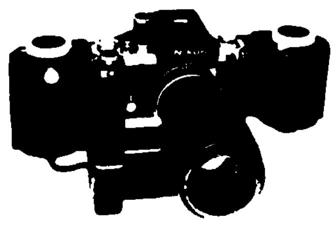
Nikonos III

The Nikonos III is unique — the only self-contained 35mm amphibious camera. It has applications in any photography that is done in and around water. This includes not only diving, boating and water sports but photography in foul weather as well. The same features that make the Nikonos III watertight also seal it against invasion by dust, grime or sand. This makes it perfect for photography on expedition, at construction sites, and the like. The Nikonos III is also applicable to medical and operating-room photography as well as industrial use.

Four lenses are available in focal lengths of 15, 28, 35 and 80mm; the 15 and 28mm lenses are designed exclusively for underwater use while the 35 and 80mm lenses can be used both under and above water. Accessories include viewers for underwater shooting, a close-up kit; a flash kit; lens protectors and hoods.

Lenses for Nikonos III:
15mm f/2.8 UW-Nikkor IC
28mm f/3.5 UW-Nikkor
35mm f/2.5 W-Nikkor
80mm f/4 Nikkor

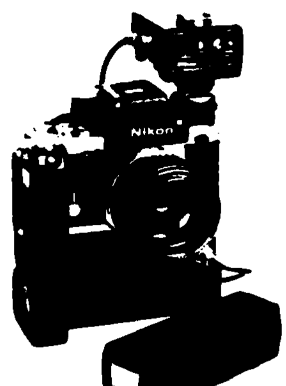




Nikon Motor Drives

For Nikon F2, F2S, F2SB, F2A, and F2AS Cameras

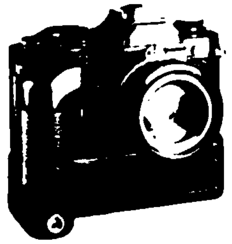
All Nikon F2 series cameras accept both the Motor Drive MD-2 and Motor Drive MD-3 without modification. The MD-2 unit is a full-featured drive offering such sophisticated advances as variable continuous-framing rates at speeds up to 5 frames per second; a shutter speed range of 1/4 to 1/2000 second in continuous-firing mode and "B" plus 1 to 1/2000 second in single-frame operation; automatic film rewind; acceptance of the 250-exposure (MF-1) and 750-exposure (MF-2) backs, the MF-3 back for automatic film-rewind shutoff, and the MF-10 and MF-11 Data Backs.



The less expensive MD-3 unit offers: a shutter-speed range of from 1/80 to 1/2000 second when used in continuous mode and "B" plus 1 to 1/1000 second in single-frame operation; continuous-firing rates of up to 4 frames per second with the MB-1 Battery Pack and nickel cadmium batteries, and acceptance of the MF-10 Data Back.

Both the MD-2 and MD-3 units offer: multiple-exposure capability via the film-rewind slide; use of the Nikon Speedlight SB-5 at shooting rates up to 3.8 frames per second; remote operation via the Modulite Unit (ML-1), Wireless Control (MW-1), Intervalometer (MT-1), or Remote Cord (MC-4); subtractive film counter with automatic shutoff at "0" that can be preset for exposure of a certain amount of frames.

Both units can be used with the following power supplies: Battery Pack MB-1, which accepts zinc carbon, alkaline or nickel cadmium batteries, the Battery Pack MB-2, which accepts zinc carbon or alkaline batteries; or the AC/DC Converter MA-4, which allows for use of alternating current.



For Nikon FM & FE Cameras

The MD-11 Motor Drive is designed specifically for use with the compact Nikon FM and FE cameras. Features include continuous-framing rates up to 3.5 frames per second at shutter speeds of 1/125 second or higher, a shutter-speed range of from 1 to 1/1000 second in single-frame operation or from 1/2 to 1/1000 second in continuous operation, remote control capability via the MC-4 Remote Cord, MT-1 Intervalometer, ML-1 Modulite and the MW-1 Radio Control, self-contained battery chamber requiring no additional battery pack, and compact size and light weight.

5294™

35 mm

EASTMAN Color High Speed Negative Film

EASTMAN Color High Speed Negative Film *5294*™ (35 mm) is a camera film intended for general motion picture production. The wide exposure latitude of this high-speed film makes it especially suitable for both indoor and outdoor photography under low-level illumination. *EASTMAN* Color High Speed Negative Film is balanced for use in tungsten light and in daylight with appropriate filters. The emulsion contains a colored-coupler mask to achieve good color reproduction in release prints. This film is characterized by very high sharpness, fine grain, and accurate tone reproduction.

EXPOSURE INDEXES

Tungsten—400 (3200 K) *Daylight—250**

These settings are recommended for use with incident- or reflected-light exposure meters and cameras marked for ASA speeds or exposure indexes. The values apply (1) if the meter reading is taken from the camera position and the subject has average reflectance or (2) if the reading is made on a gray card (such as the *KODAK Gray Cards*, *KODAK* Publication No. R-27) of about 18-percent reflectance, held close to and in front of the subject and facing the camera. For unusually light- or dark-colored subjects, the exposure indicated by the meter should be decreased or increased appropriately.

ILLUMINATION (INCIDENT LIGHT) TABLE FOR TUNGSTEN LIGHT

(24 frames per second, 170° shutter opening)

Lens Aperture	f/1.4	f/2.0	f/2.8	f/4.0	f/5.6	f/8.0	f/11
Footcandles Required	6.3	12.5	25	50	100	200	400

This table is for average subjects containing some light, some medium, and some dark colors. When a subject is composed entirely of pastels, use at least 1/2 stop less exposure. Dark colors require 1/2 stop more.

LIGHTING CONTRAST: The ratio of key-light-plus-fill-light to fill light should be 2:1 or 3:1 and should seldom exceed 4:1, except when a special effect is desired.

*With *KODAK WRATTEN* Gelatin Filter No. 85

RECIPROCITY CHARACTERISTICS

Exposure Time (second)	1/10,000	1/1000	1/50	1/10	1
Exposure Increase	None	None	None	None	+ ½ stop
KODAK CC Filter	None	None	None	None	10Y

LABORATORY AIM DENSITY (LAD) CONTROL METHOD

To assure optimum quality and consistency in the final prints, color timing, printing, and duplicating procedures need to be carefully controlled by the laboratory. To aid in color timing and curve placement, negative originals should be timed relative to the Laboratory Aim Density (LAD) Control Film supplied by Eastman Kodak Company.† The LAD Control Film provides both objective sensitometric control and subjective verification of the duplicating procedures used by the laboratory.

In the LAD control method,‡ the electronic color analyzer used for color timing is set up with the LAD Control Film to produce a gray video display of the LAD patch, corresponding to 1.0 neutral density gray on the print. The negative printing original is then scene-to-scene timed. LAD values are specified for each print or duplicating film onto which the negative original may be printed. On print films, the LAD patch is printed to a neutral gray of 1.0 visual density. On duplicating films, the specified aims are at the center of the usable straight-line portion of the duplicating film's sensitometric curve.

In addition to helping control laboratory duplicating procedures, the LAD control method provides a simple, consistent, and easily understood method of reporting the exposure on the original camera negative or duplicate negatives in the original being timed. Cinematographers may judge relative camera exposure by relating the timing information to the laboratory's normal setup balance for the LAD Control Film, usually TAPE 25-25-25.

†Inquires should be directed to one of the regional sales offices listed on the back page.

‡Use of the LAD control method is described in the paper, "A Simplified Motion-Picture Laboratory Control Method for Improved Color Duplication," by John P. Pytlak and Alfred W. Fleischer in the October 1976 SMPTE Journal.

Kodak

52 7239

35 mm 16 mm

EASTMAN EKTACHROME Video News Film (Daylight)

This high-speed color reversal film is intended for photography under low-level daylight illumination. Among its many applications are news photography, sporting events, and high-speed photography. It is a companion film to *EASTMAN EKTACHROME* Video News Film 5240 and 7240 (Tungsten). The processed original camera film is ready for projection; and because it is balanced for projection at 5400 K, it is suitable for television broadcasting.

EASTMAN EKTACHROME Video News Film 5239 and 7239 (Daylight) can be exposed at effective film speeds ranging from 1/2 to 2 times the normal exposure indexes with little loss in quality. For emergency situations in which some loss in quality is acceptable, the normal exposure index can be increased by the equivalent of 2 to 3 stops. When the film is exposed at other than the normal exposure index, the processing laboratory should be informed so that compensations can be made in processing.

The processed camera original on Video News Film (Daylight) is meant for direct projection; however, color duplicates can be made on *EASTMAN EKTACHROME* VN Print Film 5399 and 7399 or on *EASTMAN EKTACHROME* R Print Film 7389.

BASE: Clear acetate safety

IDENTIFICATION: The name "KODAK VND Safety Film" is latent-image printed along the edge.

BASIC DAYLIGHT EXPOSURE: For average subjects in bright or hazy sunlight, expose this film as follows: 24 frames per second (fps) at f/32 with a 170° shutter opening.

NOTE: Operation at a lens opening larger than f/32 is possible by making the exposure through a neutral density filter, such as a *KODAK WRATTEN* Neutral Density Filter No. 96. For example, when that filter in a density of 0.9 is used, the lens can be opened 3 full stops.

COLOR BALANCE: *EKTACHROME* Video News Film 5239 and 7239 is balanced for daylight exposure. When other light sources are used, correction filters are required as indicated in the following table.

Light Source	Camera Filter	Light Source Filter	Exposure Index*
Daylight†	None	None	160
Daylight—1 stop	0.30 ND	None	80
Daylight—2 stops	0.60 ND	None	40
	Color Compensating		
Fluorescent‡ Cool White	30M	None	100
Fluorescent‡ Deluxe Cool White	20B	None	100
White Flame Arcs	None	MR gelatin or acetate, Y-1	160
	KODAK WRATTEN Gelatin		
Yellow Flame Arcs	80A	MR gelatin or acetate, YF-101	125
	KODAK WRATTEN Gelatin		
Tungsten 3200 K	80A	None	40
Tungsten photoflood 3400 K	80B	None	50

*For use with meters marked for American National Standards speeds (ANSI speeds) or exposure indexes (EI).

†Sunlight plus some skylight.

‡**IMPORTANT:** These are approximate filter requirements. If the kind of lamps is unknown, a CC20M (magenta) Filter can be used as a starting point for a trial exposure with *EASTMAN EKTACHROME* Video News Film (Daylight). Use an exposure index (EI) of 100.

Reflected-Light Readings: These exposure indexes are recommended for use with incident- or reflected-light exposure meters and cameras marked for ASA speeds or exposure indexes. They apply (1) if the meter reading is taken from the camera position and the subject has average reflectance or (2) if the reading is made on a gray card (such as the *KODAK* Neutral Test Card) of about 18-percent reflectance held close to and in front of the subject and facing the camera.

7251

16 mm

EASTMAN EKTACHROME High Speed Daylight Film

This very-high-speed color reversal camera film makes effective photography possible with very low-level illumination. It is intended for industrial photography, instrumentation studies, sporting events, and high-speed photography by daylight, xenon, and metal halide lamps. The processed original film is balanced for direct projection at 5400 K, with contrast suitable for television broadcasting.

EASTMAN EKTACHROME High Speed Daylight Film 7251 can be exposed at effective speeds up to twice the normal exposure indexes with little loss in quality. In situations where some loss in quality is acceptable, the normal exposure index can be increased by the equivalent of two lens stops. When the film is exposed at other than the normal exposure index, the processing laboratory should be informed so that appropriate compensations can be made in the processing.

The processed camera original of this high-speed film is meant for direct projection; however, color duplicates can be made on *EASTMAN EKTACHROME* VN Print Film 7399 or *EASTMAN EKTACHROME* R Print Film 7389.

EXPOSURE INDEXES

Daylight—400 *Tungsten*—100* (3200 K)

These exposure indexes are recommended for use with incident- or reflected-light exposure meters or cameras marked for ASA speeds or exposure indexes. The values apply (1) if the meter reading is taken from the camera position and the subject has average reflectance or (2) if the reading is made on a gray card (such as the *KODAK* Neutral Test Card) of about 18-percent reflectance, held close to and in front of the subject, and facing the camera. For unusually light- or dark-colored subjects, the exposure indicated by the meter should be decreased or increased appropriately.

Exposure for Airborne Subjects

A trial exposure based on an exposure index of 640 should be made if this film is to be used to photograph objects such as missiles or aircraft against a sky background. First, take a reading with the meter pointed at the portion of the sky to be photographed. Then, set the sky reading on the calculator dial and read the appropriate combination of shutter speed and *f*-number. For critical work, a series of test exposures should be made with the meter and camera equipment that will be used in photographing the airborne subjects.

*With a *KODAK WRATTEN* Gelatin Filter No. 80A

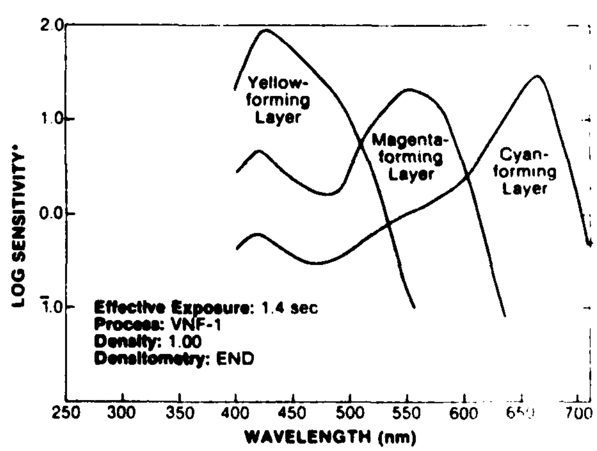
ILLUMINATION (INCIDENT LIGHT) TABLE FOR DAYLIGHT (NORMAL EXPOSURE)

(24 frames per second [fps], 170° shutter opening)

Lens Aperture	f/1.4	f/2.0	f/2.8	f/4.0	f/5.6	f/8.0	f/11	f/16	f/22
Foot-candles Required	6.3	12.5	25	50	100	200	400	800	1600

This table is for average subjects containing some light, some medium, and some dark colors. When a subject is composed entirely of pastels, use at least 1/2 stop less exposure; dark colors require 1/2 stop more.

SPECTRAL SENSITIVITY CURVES



Sensitivity equals the reciprocal of the exposure (ergs/cm²) required to produce specified density

7291

16 mm

EASTMAN Color Negative Film

EASTMAN Color Negative Film 7291 (16 mm) is a camera film intended for general motion picture production. The wide exposure latitude of this film makes it especially suitable for both indoor and outdoor photography under a wide variety of conditions.

This film is balanced for use in tungsten light and in daylight with appropriate filtration. The emulsion contains a colored-coupler mask to achieve good color reproduction in release prints. This film is characterized by very high sharpness, fine grain, and excellent color rendition.

EXPOSURE INDEXES

Tungsten—100 (3200 K) *Daylight—64**

These settings are recommended for use with incident- or reflected-light exposure meters and cameras marked for ASA speeds or exposure indexes. The values apply (1) if the meter reading is taken from the camera position and the subject has average reflectance or (2) if the reading is made on a gray card (such as the *KODAK Gray Cards, KODAK* Publication No. R-27) of about 18-percent reflectance, held close to and in front of the subject and facing the camera. For unusually light- or dark-colored subjects, the exposure indicated by the meter should be decreased or increased appropriately.

ILLUMINATION (INCIDENT LIGHT) TABLE FOR TUNGSTEN LIGHT

(24 frames per second, 170° shutter opening)

Lens Aperture	f/1.4	f/2.0	f/2.8	f/4.0	f/5.6	f/8.0	f/11
Footcandles Required	25	50	100	200	400	800	1600

LIGHTING CONTRAST: The ratio of key-light-plus-fill-light to fill light should be 2:1 or 3:1 and should seldom exceed 4:1, except when a special effect is desired.

*With *KODAK WRATTEN* Gelatin Filter No. 85.

RECIPROCITY CHARACTERISTICS

Exposure Time (second)	1/10,000	1/1000	1/50	1/10	1
Exposure Increase	None	None	None	None	+ ⅓ stop
KODAK CC Filter	None	None	None	None	None

LABORATORY AIM DENSITY (LAD) CONTROL METHOD

To assure optimum quality and consistency in the final prints, color timing, printing, and duplicating procedures need to be carefully controlled by the laboratory. To aid in color timing and curve placement, negative originals should be timed relative to the LAD Control Film supplied by Eastman Kodak Company.† This film provides both objective sensitometric control and subjective verification of the duplicating procedures used by the laboratory.

In the LAD control method,‡ the electronic color analyzer used for color timing is set up with the LAD Control Film to produce a gray video display of the LAD patch, corresponding to 1.0 neutral density gray on the print. The negative printing original is then scene-to-scene timed. LAD values are specified for each print or duplicating film onto which the negative original may be printed. On print films, the LAD patch is printed to a neutral gray of 1.0 visual density. On duplicating films, the specified aims are at the center of the usable straight-line portion of the duplicating film's sensitometric curve.

In addition to helping control laboratory duplicating procedures, the LAD control method provides a simple, consistent, and easily understood method of reporting the exposure on the original camera negative or duplicate negatives in the original being timed. Cinematographers may judge relative camera exposure by relating the timing information to the laboratory's normal setup balance for the LAD Control Film, usually TAPE 25-25-25.

†Inquires should be directed to one of the regional sales offices listed on the back page.

‡Use of the LAD control method is described in the paper, "A Simplified Motion-Picture Laboratory Control Method for Improved Color Duplication," by John P. Pytlak and Alfred W. Fleischer in the October 1976 SMPTE Journal.

Kodak

7294

16 mm

EASTMAN Color High Speed Negative Film

EASTMAN Color High Speed Negative Film 7294 (16 mm) is a camera film intended for general motion picture production. The wide exposure latitude of this film makes it especially suitable for both indoor and outdoor photography under low-level illumination. *EASTMAN* Color High Speed Negative Film is balanced for use in tungsten light and in daylight with appropriate filters. The emulsion contains a colored-coupler mask to achieve good color reproduction in release prints. This film is characterized by very high sharpness, fine grain, and accurate tone reproduction.

EXPOSURE INDEXES

Tungsten—320 (3200 K) *Daylight—200**

These settings are recommended for use with incident- or reflected-light exposure meters and cameras marked for ASA speeds or exposure indexes. The values apply (1) if the meter reading is taken from the camera position and the subject has average reflectance or (2) if the reading is made on a gray card (such as the *KODAK Gray Cards, KODAK* Publication No. R-27) of about 18-percent reflectance, held close to and in front of the subject and facing the camera. For unusually light- or dark-colored subjects, the exposure indicated by the meter should be decreased or increased appropriately.

ILLUMINATION (INCIDENT LIGHT) TABLE FOR TUNGSTEN LIGHT

(24 frames per second, 170° shutter opening)

Lens Aperture	f/1.4	f/2.0	f/2.8	f/4.0	f/5.6	f/8.0	f/11
Footcandles Required	8	16	32	63	125	250	500

This table is for average subjects containing some light, some medium, and some dark colors. When a subject is composed entirely of pastels, use at least ½ stop less exposure. Dark colors require ½ stop more.

LIGHTING CONTRAST: The ratio of key-light-plus-fill-light to fill light should be 2:1 or 3:1 and should seldom exceed 4:1, except when a special effect is desired.

*With *KODAK WRATTEN* Gelatin Filter No. 85

RECIPROCITY CHARACTERISTICS

Exposure Time (second)	1/10,000	1/1000	1/50	1/10	1
Exposure Increase	None	None	None	None	+ ½ stop
KODAK CC Filter	None	None	None	None	10Y

LABORATORY AIM DENSITY (LAD) CONTROL METHOD

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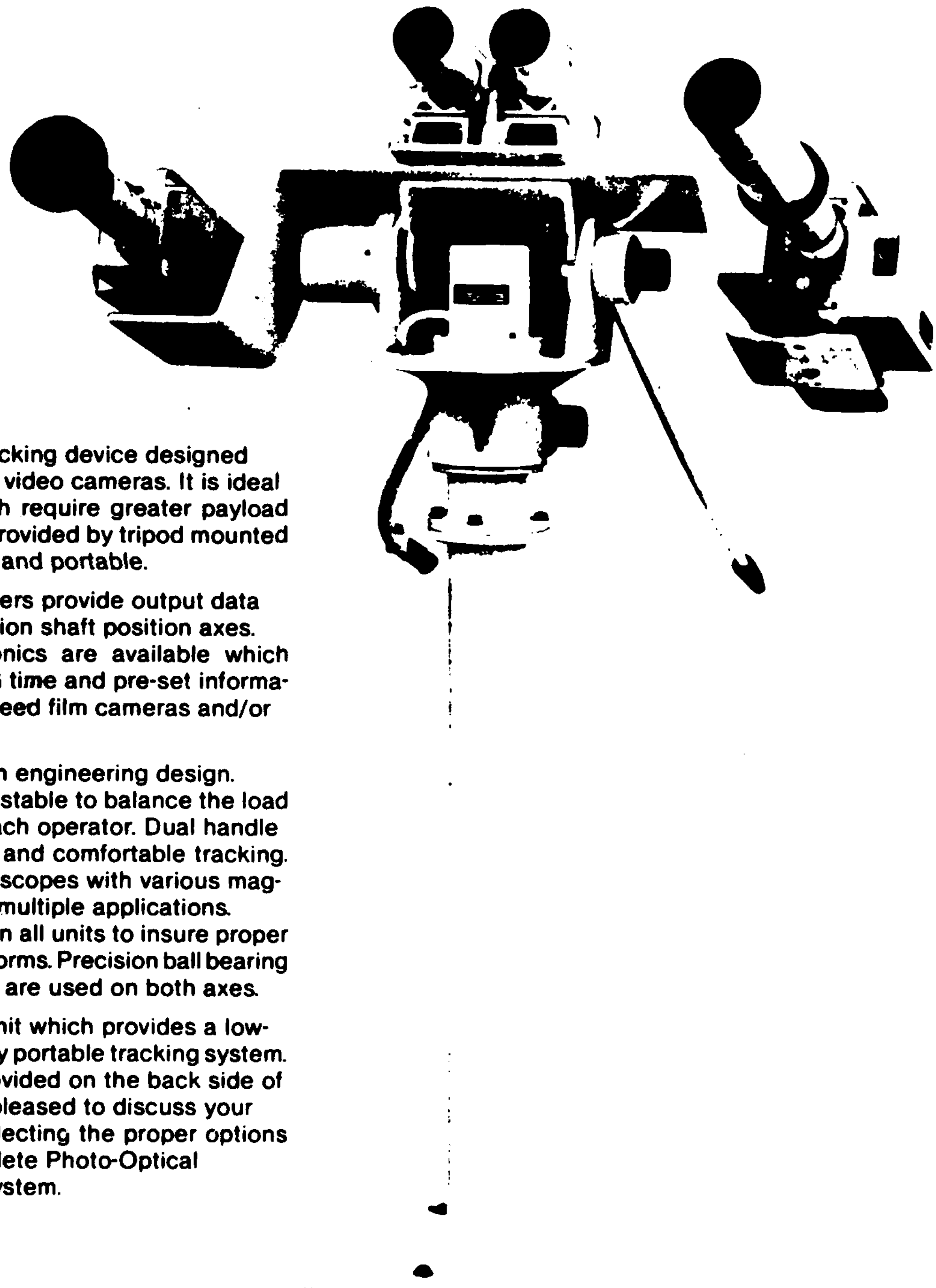
VISUAL INSTRUMENTATION CORPORATION

OE-84B Optical Tracking System



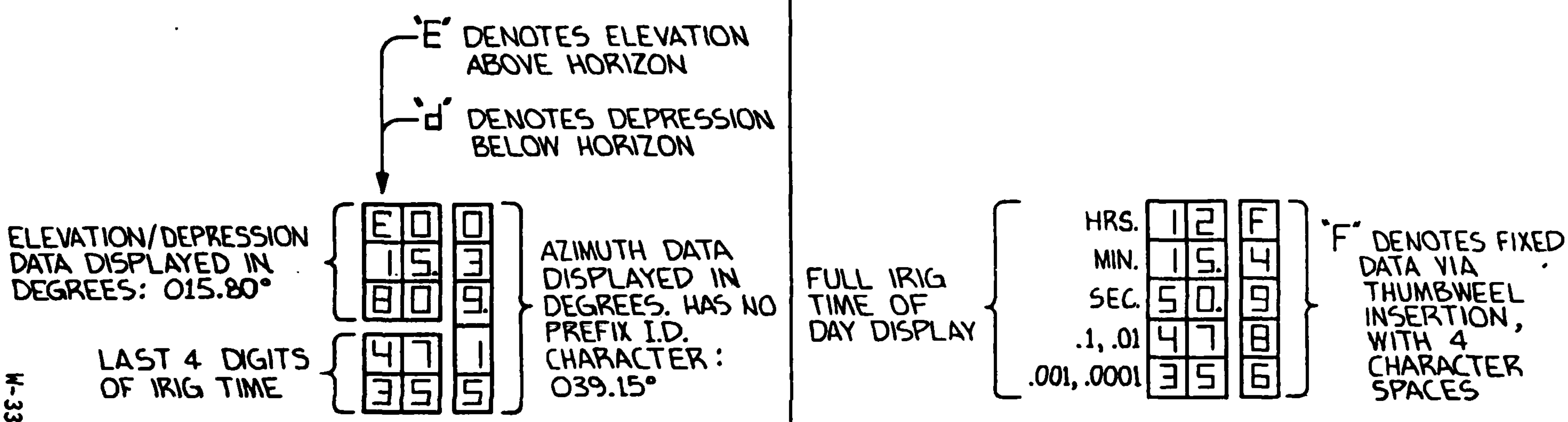
The OE-84B is a manual tracking device designed for instrumentation film and video cameras. It is ideal for those applications which require greater payload and precision than can be provided by tripod mounted cameras and is easy to use and portable.

Optional resolvers or encoders provide output data for both Azimuth and Elevation shaft position axes. Complete interface electronics are available which handle the AZ-EL data, IRIG time and pre-set information for recording in high speed film cameras and/or video systems.

The OE-84B features human engineering design. Friction on each axis is adjustable to balance the load and set the "Feel" to suit each operator. Dual handle bars are positioned for fast and comfortable tracking. Binocular or Monocular telescopes with various magnifications are available for multiple applications. Water tests are performed on all units to insure proper operation after severe rain storms. Precision ball bearing with rubber type shaft seals are used on both axes.

The OE-84B is a versatile unit which provides a low-cost solution for a completely portable tracking system. Specification details are provided on the back side of this data sheet. We will be pleased to discuss your application and assist in selecting the proper options and accessories for a complete Photo-Optical Tracking/Data Recording System.

903 NORTH VICTORY BOULEVARD, BURBANK, CALIFORNIA 91502 (213) 843-5311 TELEX 68-6432



THIS ILLUSTRATION IS RECORDED ON 49 CONSECUTIVE FILM FRAMES

THIS ILLUSTRATION IS RECORDED ONCE EVERY 50 FRAMES

VISUAL INSTRUMENTATION CORPORATION
903 NORTH VICTORY BOULEVARD, BURBANK, CALIFORNIA 91502

HDRS TIME SHARE DISPLAY FOR AV-84B SYSTEM

12-15-83 | RAGUSA | 101938

STANDARD SPECIFICATION

LOAD CAPACITY: 80 pounds with 40 pounds on each side

SYSTEM WEIGHT: 76 pounds, including monocular, camera platform & pedestal

TRACKING HEAD WEIGHT: 37 pounds, less camera platform & pedestal

PEDESTAL WEIGHT: 17 pounds

SYSTEM DIMENSIONS: 63.0 inches high

TRACKING HEAD: 23.0 inches wide
25.0 inches deep

CAMERA PLATFORM: 37.5 x 8 x .5 inches

PEDESTAL BASE: 8 inch base plate with 4 ea. 5/8 inch thru holes on 6 inch centers and 3 ea. adjustment bolts (1/2 inch)

LEVELING: Circular bubble level provides 0.05 degrees accuracy using 3 ea. adjustment bolts on pedestal base.

AZIMUTH TRAVEL: ± 360 degrees

ELEVATION TRAVEL: −6 degrees to +92 degrees

DRAG TORQUE: Adjustable

TRACKING HANDLES: Dual handle bars with weatherproof switch on one handle. Provides switch closure when depressed.

ENVIRONMENT: Operates in full rain

CONSTRUCTION: Head & pedestal aluminum, all shafts & hardware are corrosion resistant steel

FINISH: Missile range white per MIL-F-14072

OPTIONS

12 BIT RESOLVERS ON AZIMUTH & ELEVATION AXES: Furnished with digital converters which provide 16 Bit parallel BCD output. (Requires 115VAC 50/60 Hz.)

15 BIT OPTICAL ENCODERS ON AZIMUTH & ELEVATION AXES: Provides 20 Bit parallel BCD output

TRACKING MONOCULAR(s): 12X, 20X or 22X wide angle with 45° viewing angle to line of sight. Includes dual circular reticles.

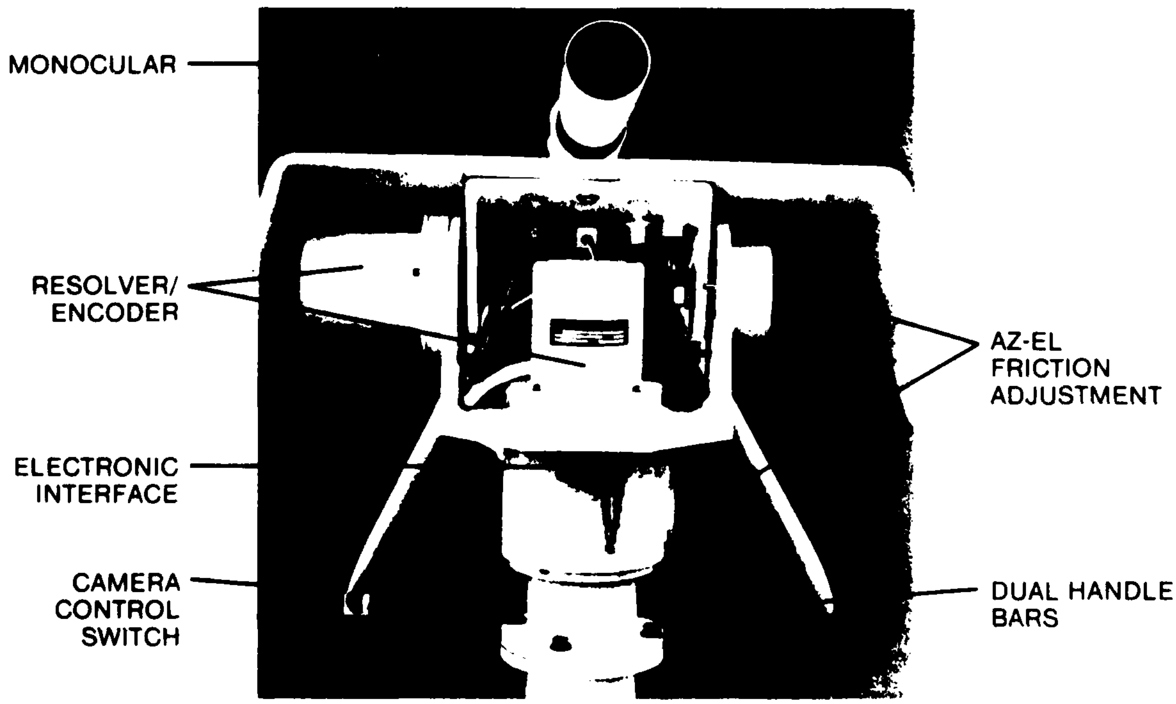
TRACKING BINOCULAR: 15X wide angle with 45° viewing angle to line of sight. Includes dual circular reticles in left eyepiece and interpupillary adjustment.

ELECTRONIC INTERFACE: Accepts resolver/encoder outputs for local display of AZ-EL data with IRIG time and pre-set information. Also handles this data for recording in film cameras and/or video systems. See HDRS data sheet for details.

DIGITAL DISPLAY MODULE (LOCAL): Liquid crystal display of: Azimuth, elevation and IRIG time. Mounts on camera platform for viewing by operator.

POWER INVERTER(S): 24VDC to 115VAC or 230VAC 50/60 Hz. (For use with resolvers.)

CARRYING CASES: For tracking head and monocular or binocular.



The OE-48B is manufactured by ABA Electromechanical Systems, Inc., Pinellas Park, Florida, USA

APPENDIX X

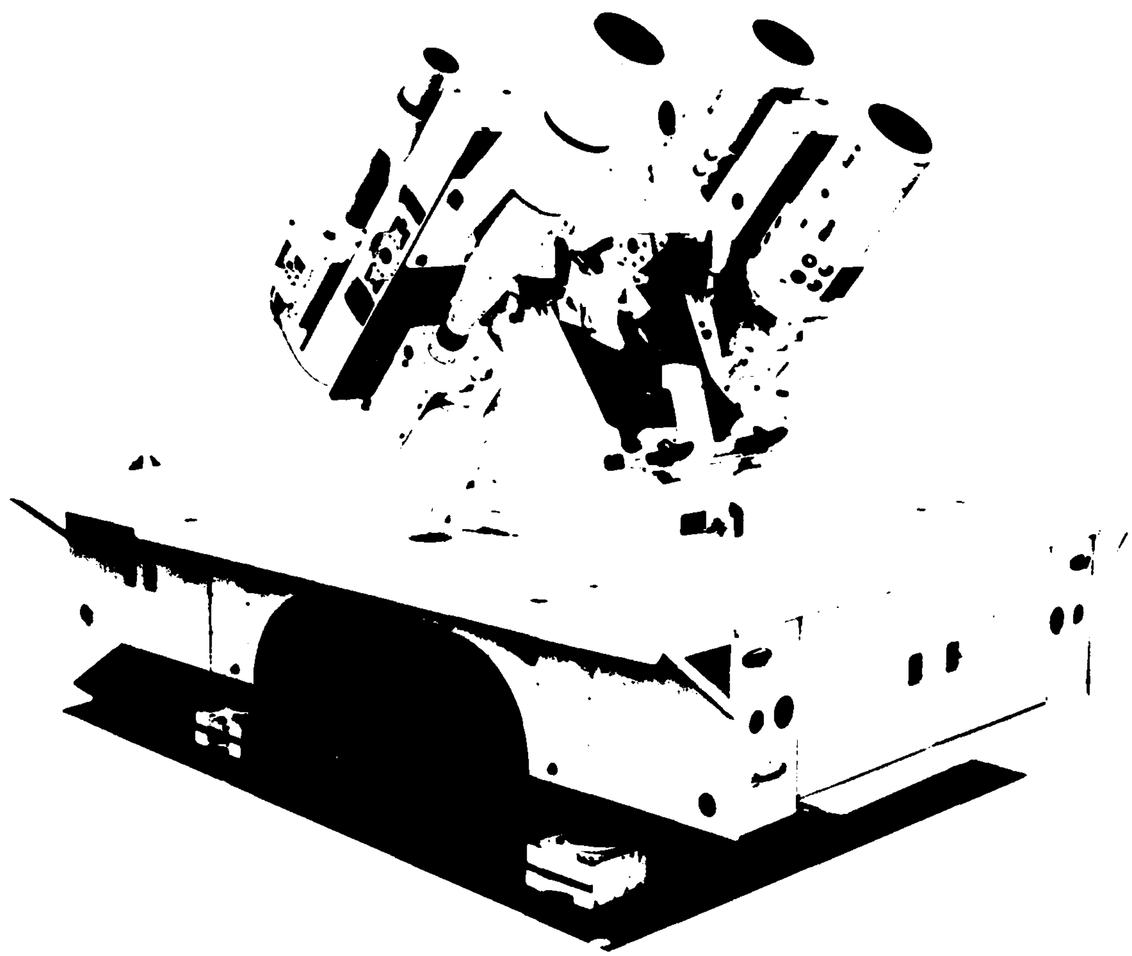
Photo-Sonics, Inc.
SPEC/DATA SHEET
Cine-Sextant Tracking Mount

Photo-Sonics, Inc.
820 SOUTH MARIPOSA STREET / BURBANK, CALIFORNIA 91506

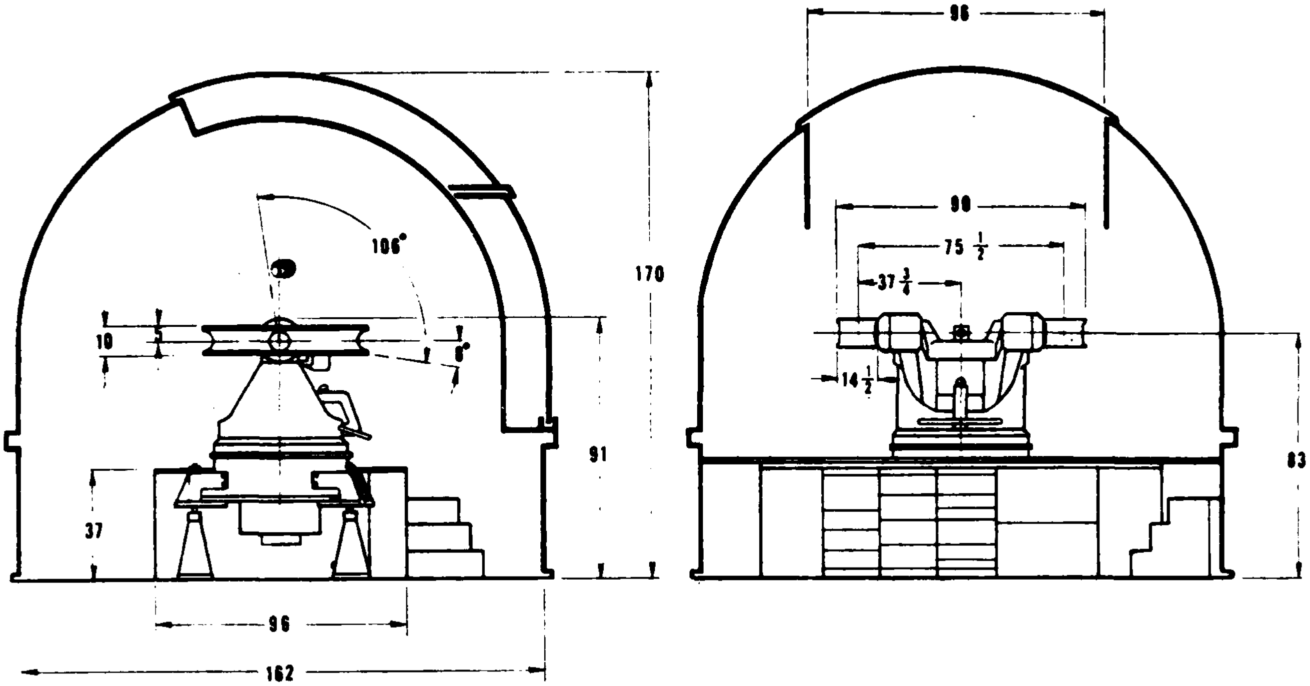
SPEC / DATA SHEET

Cine-Sextant

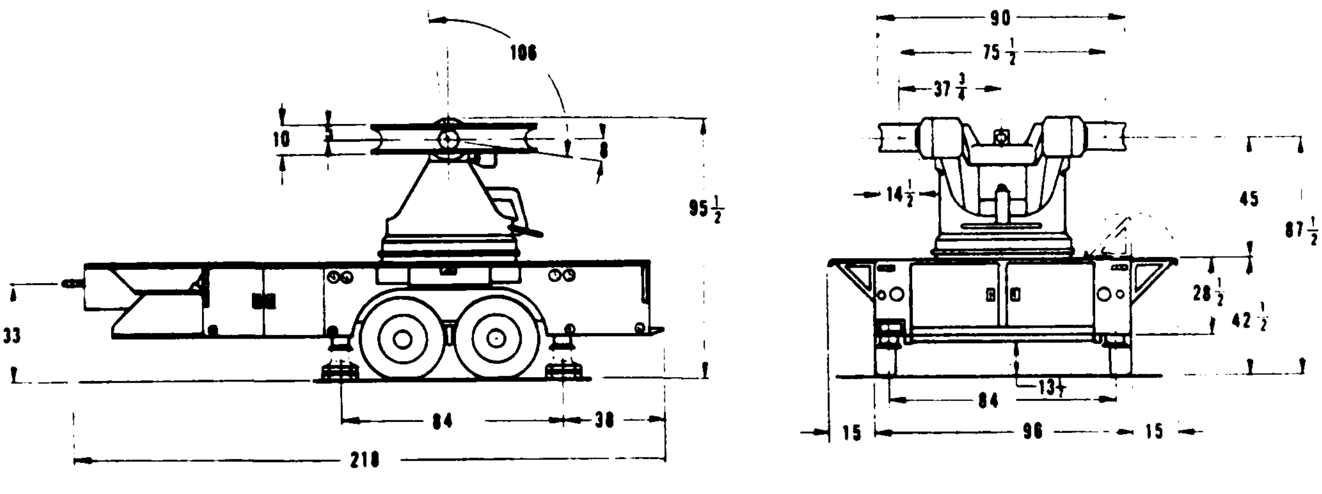
Tracking Mount



Manufactured by Photo-Sonics, Inc., 820 South Mariposa Street, Burbank, California 91506/213-849-6251--Telex 673205



FIXED SITE



MOBILE

Standard dimensions shown — subject to change without notice

APPENDIX Y

INTEROFFICE MEMORANDUM
FROM: S. Glazer
SUBJECT: Infrared Observations of the CID Test
1 March 1985

JET PROPULSION LABORATORY

INTEROFFICE MEMORANDUM

3546-TSE-85-012

1 March 1985

TO: J. Gregoire

FROM: S. Glazer SDG

SUBJECT: Infrared Observations of the CID Test

An Inframetrics model 525 real time scanning infrared radiometer was used to record infrared images of the Controlled Impact Demonstration (CID) airplane crash test on December 1, 1984 at Edwards Air Force Base. The scanner unit was mounted on a remotely controlled tracking platform approximately 2000 feet perpendicular to the anticipated crash path. Test procedures required the camera operator to be evacuated from the tracker site approximately 1-1/2 hours before the crash. The instrument dynamic range and absolute temperature level were set at that time, although desert and sky background temperatures were still slowly warming. A. Trimm of Vandenburg A.F.B. loaded the camera with liquid nitrogen (for sensor cooling) and activated the on site video recorder just prior to final site evacuation.

Post crash analysis of the video tape indicated that the dynamic range and level permitted low contract observation of the aircraft prior to the burning, and clear observation of the location of initial burning. Selected individual frames from the video data, taken directly from a television monitor, are shown in figures 1-3. Actual infrared data is quantized into 64 discrete levels over the dynamic range, and is normally displayed in black and white. Figure 1 is the only one of the 6 for which the infrared data was quantized into 6 discrete levels (plus black and white). It shows the aircraft against the relatively cold sky background just prior to the moment of crash. Temperatures represented by individual gray levels increase from left to right on the gray scale at the bottom of the frame. Heat from three of the engines is clearly visible in this frame.

Figure 2 was taken at the moment of initial wing contact with the ground. Heat generated from friction is seen being left on the ground beneath the wing. The fuselage of the aircraft partially obscures the view, as the wing on the far side (from the cameras' position) skidded on the ground. The intensity of the heat visible does not appear to indicate that burning started at this time. The object in the foreground is a stationary ground based electrical generator.

Figures 3a-3d are part of a sequence taken at the moment the aircraft's number 3 engine and right wing contacted the stationary wing cutter. As in the previous sequence, white is hot. The outline of a portion of the wing cutter is seen as the small triangular stationary object. Significant heat is not observed until the moment of contact. Individual frames, separated in time by

approximately 1/30 second, show the growth of the burning fuel cloud emanating from the number 3 engine after the impact. This appears to be the primary ignition source. The intensity of the heat caused the white saturation on the display. Subsequent frames became completely saturated as the flames encompassed the entire field of view.

The infrared camera results corroborated the high speed visual films. It was hoped that the infrared observations would help pinpoint other ignition sources and hot objects, had the crash occurred as expected.

gm

Attachment

Distribution:
D. Dipprey/H. Cotrill
W. Hornaday
C. Lifer/B. Wada
R. Miyake
J. Stultz

FIG. 2

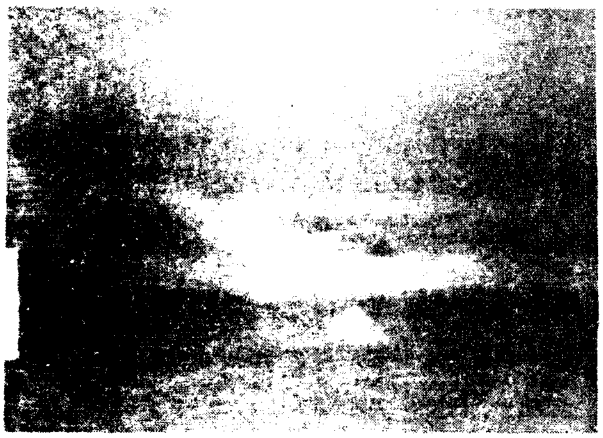


FIG. 3A

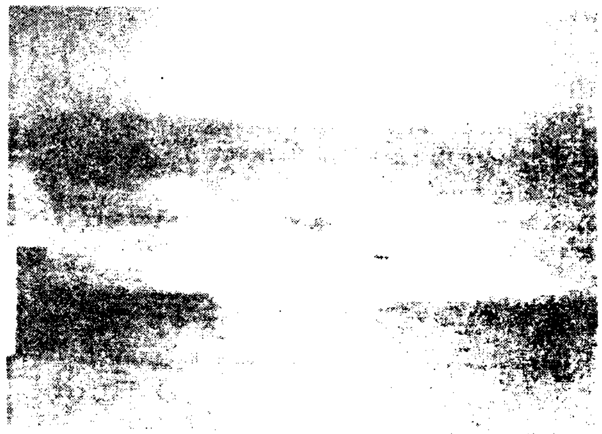
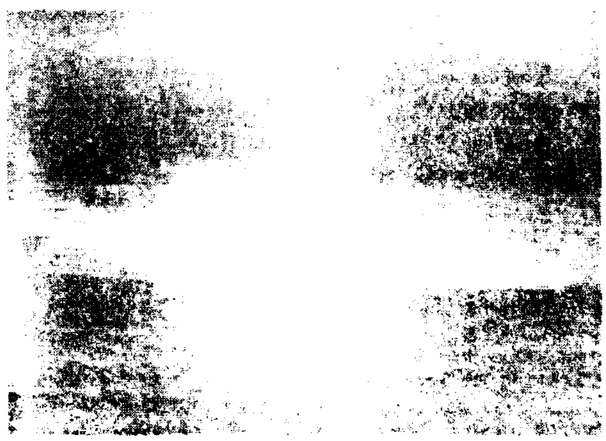


FIG. 3B



APPENDIX Z

TRIP REPORTS

HELICOPTER TRIP REPORT
1 DECEMBER 1984
CONTROLLED IMPACT DEMONSTRATION
EDWARDS AIR FORCE BASE

CID SUMMARY
William Tibbitts

CAST GLANCE TRIP REPORT
1 DEC 1984
Controlled Impact Demonstration

IOM, FROM: Phil Neuhauser,
SUBJECT: CID - Cast Glance Report, December 3, 1984

IOM, FROM: GREGG HANCHETT, SUBJECT: C.I.D. DEBRIEF

IOM, FROM: Tom Wynne

IOM, FROM: Gordon Maughan, SUBJECT: CID De-Brief

IOM, FROM: C. BORST, SUBJECT: CID THE REAL STORY

IOM, FROM: S. L. BRIDGES, SUBJECT: Notes on My Part in the CID Photo Coverage, December 10, 1984

IOM, FROM: W. J. Hornaday, SUBJECT: Critique of the CID exercise, December 12, 1984

CID PHOTO NOTES FROM TERRY FAIL

C.I.D. Impressions, Carol L. Lachata

Letter, from ADVANCED TECHNOLOGY DIVISION, SYMBOLIZED SYSTEMS, INC., December 14, 1984

MEMO, FROM Gil Pendley, SUBJECT: HIGH SPEED PHOTOGRAPHIC COVERAGE OF CONTROLLED IMPACT DEMONSTRATION AT EDWARDS AIR FORCE BASE, CALIFORNIA January 7, 1985

LAST DAYS OF CID
BY TONI BURKE

Comments on CID Test (Bill Shipman)

HELICOPTER TRIP REPORT
1 DECEMBER 1984
CONTROLLED IMPACT DEMONSTRATION
EDWARDS AIR FORCE FORCE BASE

After arriving at the NASA building from the BOQ via base taxi, camera equipment was checked out prior to departure to helo line. Transportation to the helo line was furnished by Bill Tibbets. Set up both helicopters was relatively simple, no major complications arose. There was a slight problem in the communication connector between the PMTC helmet and the Army helicopter comm line. Listening capability only was achieved by a quick fix while enroute to impact site.

After initial site check out and helicopter positioning both helicopters touched down close to their respective operating location. While awaiting the 720 take-off, last minute camera and communication checks were made. After the 720 take-off, both helicopters took off and ascended to their operating altitude, which was 700 feet by 1000 feet laterally. Both helicopters were just forward of the initial impact cross, which gave us an excellent overall view.

As the 720 approached impact, the pilot maintained excellent positioning; the count-down was clear and appeared accurate. Cameras were turned on as the 720 was approxiamately 200 ft. from impact and ran through out the event.

During the actual event the helicopter pilot turned the helo slightly to ensure the best possible positioning during the entire event.

After photo coverage was complete, the helicopters were required to stay on station before returning to main base. After hovering for 15 minutes the helicopters were released back to the NASA building where the photographers were disembarked. Once the camera gear was packed away, we were shuttled by a NASA employee to the main aircraft ramp where we boarded the PMTC P-3 for our return flight to Point Mugu.

Mission complete, we were satisfied with the overall feeling of a job well done. Upon arrival at Point Mugu all film was loaded and delivered to Phil Neuhauser for hand carrying to JPL.

Overall cooperation between all concerned, especially the helicopter pilots was excellent. Their concern for our safety was always maintained to the utmost degree.

CID SUMMARY
William Tibbitts

12/1/84	
0230	Arrive JPL-Edwards Facility. Load 3 JPL on-board cameras, mags, extra film coffee, etc. into NASA 7237. Suit up in required yellow "Jamies" and head for NASA Dryden to join 720 ground crew to convy to lakebed 17/22.
0315	NASA Dryden F-16/720 hanger, off load coffee into 720 ground crew vehicle. Every body is really "up". This day feel good already. Still have'nt quite figured out how to get the JPL security guard's CID pass to him, but first things first. Then mount up and we're heading out.
0330	Arrive lakebed 17/22. We're first group on scene. Poor bird sure looks lonesome out here. Vehicles in position,more lights on, aux ? ?on, stairs etc. in position lots of activity, lots of yellow ants all around and in and out of the plane. More support vehicles arriving.
0400	NASA 25 shows up, Toni and Greg aboard, now we're legal to start work, something we have been doing for 45 minutes anyhow. Nose camera in first so radone can be buttoned up, then to the hi-ranger for the tail camera. For once, no problems with the hig-ranger. Everthing is going, very, very smooth - keep waiting for a glitch. Door camera installed. Joe's flight book signed off. Time for a cup of tea, this whole thing has taken about an hour. Greg needs a radio battery run over to the impact site for the Vandenburg folks, guess who gets the job. Do you know how black that lake bed is at 4 in the AM? Bid fond farewell to NASA 25 and head back to Dryden. Its' now light so I almost don't miss the Santa Fe Trail.
0515	Left note on Visitor's Control for JPL guard to P.U. Pass at gift shop and had for JPL Edwards to P.U. flight gear.
0600	Arrive Dryden to wait for Pt. Magu photogs - cup of tea, p. butter, v. cheese and mayo sand. and L.A Times for breakfast. Beautiful morning - could'nt ask for better weather.

0630	Right on time Magu guys show up and go to load their cameras, have to get 1 guy to Army ramp at 0700 for flight.
0645	Check to see if Magu guys are doing O.K. They sure are, they've trapped a lovely from NASA.
0700	My Magu guy has'nt come out yet. So I go look again, still has lovely trapped. Un-trap her - him or whoever and head for Army ramp about 0715
0720	Arrive Army ramp. Every body get suited up, Dryden photog, Magu, pilots, etc. Commanding Officer of Army flight test drops by to say Howdy. According to radio traffic everything is going very well. Ground haze has lifted and weather looks great. Everyone ready, now is wait time until we crank. Start the helicopeter naturally.
0810	All Aboard. Crank, join up with Ames hilio and proceed to lakebed station. Several practice runs on station, picking best angle etc., one more time with feeling, then set down on the lake bed and wait for 720 take-off.
0900	We lift off to hover position awaiting. Take off.
0913	As we watch the 720 lift into the air our pilot comments, very solemely, over the inter-com "there aint' nobody in there folks." Awsome sight as we watch it climb for altitute with nobody home. Watched 720 climb to altitudes and approach impact site as planned.
0920	720 descending to impact site, is oscillating and yawing as it reaches lower altitudes, at impact - "Oh shit is heard from more then one person over the inter-com. What we see is not what we thought we were going to see. Oh well, at least "it's" down. Now we have to retrieve a Dryden still camera form camera station #5 and take the film back to Dryden for PIO release. Only one problem, our pilot forgets he is suppose to get o.k. from NASA 25 to land - Dryden potog is already to camera station before NASA 25 - Roger B. finally sees him and sounds

like he's going to stroke out. "Nobody gave you permission to land" - over and over, what does he want us to do, take off and leave the guy? We and he are in perfectly safe position, away from the burning airplane. Photog back on board, but now, we go by the book. Ask may I, but burning won't let us take off, He'll show us. Finally someone higher then God, intervens and we proceed back to Dryden to drop off Magu and Dryden photogs, then to Army ramp to off load and back to Dryden to P.U. FAA, video and still and m.p. team and return to Army for their flight.

1000 P.U. FAA troops and head for Army - no big hurry now - sucker still burning - FAA Away - OOPS guess who's CID access pass just disappeared. For the next 31 minutes one FAA guy what did'nt go and I searched every grain of sand and inch of asphalt for by badge. Finally found it out on the taxi way, 200 feet from where I dropped it. FAA guy suppose to shoot his crew as they land at Dryden, but due to badge hunt does'nt make it. Back at Dryden Ames helio photog relates good news his hi-speed camera jammed and NASE photogs (Army) did'nt run at all. Later found out NASA camera power switch not turned on. You get what you pay for John. One more chore to do. Get the video tapes from the P-3 only, "where the hell is it?" After several rado comms with photo one and appearnce of Magu photog who needs a ride to the P-3, find they're waiting for me at base ops., nobody thought to let me know they landed. Magu, again, has same NASA lovely in tow. Must be the flight suit or the fact that he keeps licking his eyebrows. Pick up video tapes at P-3 and return then to Dryden video trailer - leaving NASA lovely to enjoy tour of P-3, JPL guard is there so he go his pass o.k. Ready to go home but made the mistake of calling John on the radio. He has no wheels and wants me and radio to cross lake bed and tramp back to Dryden so way we go again.

1445 Arrive at Edwards facility and pack it in.

CAST GLANCE TRIP REPORT
1 DEC 1984
Controlled Impact Demonstration

Aircraft preflight began at Point Mugu NAS at approximately 0530, and we were joined by Phil Neuhauser of JPL at about 0630. Planned take-off was 0730, actual take-off was 0726, with no complications. Arrival in Edwards air space was about 0755, at which time we took up a holding pattern over the North portion of the base to await the CID aircraft's take-off. The exact times for the following events were not noted.

Some confusion existed in the P-3 when the CID aircraft actually began its take-off roll. The pilot (maintaining the radio communications with the ground) was unaware of the planned take-off, and consequently, we were slightly out of position for photographing the initial take-off rolls.

We acquired the CID aircraft (and the King air) soon thereafter, and tracked them (with continuous video coverage) to the southern portion of the planned first run to impact. At that time, we accelerated and cut across the CID aircraft's flight path (at 7K), in order to gain the desired position at impact. Having passed just North of the impact area, we again turned right and cut across the 720's predicted flight-path, at this time about 6 miles in front of it. We reacquired tracking of the 720 at that time, and continued tracking as we continued on around until we were approximately at the 720's 3 o'clock position, on a reverse heading, at impact.

Some confusion again existed as to whether or not the aircraft was going around or was continuing on to impact. This was mainly caused due to a cessation of altitude calls after 200 feet (this can be confirmed by the audio recordings on the Cast Glance video tapes). Our key call for turning on cameras was 150 feet, a call we never received.

After impact, we continued around in a starboard orbit for continuous video coverage of the fire fighting and intermittent film coverage. After 10 to 15 minutes of this (not being able to receive the emergency beacon we were expecting) we landed at Edwards to drop off our video tapes and to pick up our photographers from the helicopters. Once they arrived, we departed for Pt. Mugu. Arriving back at Pt. Mugu at 1150, all film was downloaded and delivered to Phil Neuhauser, for hand carrying to JPL.

JET PROPULSION LABORATORY

INTEROFFICE MEMORANDUM

December 3, 1984

TO: John Gregoire

FROM: Phil Neuhauser PN

SUBJECT: CID - Cast Glance Report

November 30, 1984

1300 Departed JPL for travel via JPL car to Pt. Mugu.

1430 Arrival at Pt. Mugu Cast Glance facility, 82 miles from JPL. Off-loaded videocassettes (3/4) and plastic film bags with film logs with Cast Glance photographer, Jim Hochstetler. Jim Karosz also in attendance.

1540 Departed Pt. Mugu for Los Posas Motel, Camarillo.

1610 Arrived Los Posas Motel, 11 miles from Pt. Mugu.

December 1, 1984

0550 Departed motel for Pt. Mugu.

0630 Arrived at P-3 Orion flight ramp at Pt. Mugu. Assisted Cast Glance crew in loading aircraft. Received flight crew instructions.

0710 Airborne for flight to Edwards using Military Flight Plan.

0800 Arrived at Edwards and assumed trial practice flight profile in relationship to prescribed "race track" maneuvers. Cast Glance crew readied system, cameras, and recording equipment. Received CID aircraft flight plan with scheduled liftoff for 0900.

0914 CID 720 aircraft roll and takeoff. My position in P-3 Orion was at rear starboard fuselage "belly" view port.

0940 720 commences descent and completes impact. Noticeable drift to left with starboard wing in up position, counteracted by lowering port wing and attempt to align and level aircraft. Impact occurred with nose of 720 pointed slight left of target line and approximately 150 yards short of "X" marker. Elevation callouts by controller were clipped and last audible elevation was "200 feet." Cast Glance photographers were previously instructed to start systems at "150 foot" marker;

however, crew recognized rapid descent of aircraft and approaching impact was evident by 720 in relationship to its ground shadow. All systems were started at about the "200 foot" level.

Coverage by all cameras from Cast Glance preceding, during, and after impact was complete and satisfactory with no critical glitches. Black and white video recording was momentarily blanked out by bright flash from fuel flash on later examination. This was anticipated due to low infrared limites.

Nikon still photo coverage was after impact due to position in aircraft and restrictions in viewing area. Camera used primarily for general coverage of P-3 Orion aircraft, crew members, Cast Glance system and operators and mission participant views.

P-3 aircraft continued to manuever over CID crash site to obtain coverage of fire engine and fire-fighting operations.

P-3 landed at Edwards AFB Transient aircraft area where crew deplaned for Operations building.

Pt. Mugu still photographers assigned to obtain still photos from hovering helicopters arrived at parked P-3 to deliver unprocessed flim to me.

William Tibbetts, JPL Edwards Rocket Test Center staff photographer, arrived at P-3 aircraft to receive all dubbed video of test. Arrival was approximately 45 minutes after landing at Transient area.

1115 P-3 departed Edwards for Pt. Mugu.

1156 Arrived at Pt. Mugu. Off-loaded all Cast Glance and motion picture footage.

Cast Glance crew completed all JPL-furnished film logs and placed all film and still photo rolls in plastic bags and turned over to me for return to JPL.

1430 Departed Pt. Mugu for JPL.

1630 Off-loaded film bags in carton at Main Guard shack and parked JPL car at Transportation lot. Examined all dubbed video on large screen monitor.

Cast Glance Participants

Plane Commander:	CDR Croll
Pilot:	LCDR Roberts
Flight Engineer:	Griesing
Air Crew:	A01 Adams
	AT2 Reed
Cast Glance:	Jim Gallagher
	Jerry Karosz
	Jim Hochstetler
	Doug Bradley
	Bruce Richards
	Jerry Winery

Request From Cast Glance

Doug Bradley, Pt. Mugu Photolab, would like all ground coverage video sent to him so that he could prepare composite video production of CID test.

Jim Hochstetler and Jim Gallagher would like to receive 5-6 packets of JPL folder with JPL/NASA brochres, lithos, and buttons similar to what I delivered on November 30.

Addresses:

Doug Bradley
Code 3423.2
Bldg. 36
P.M.T.C., Pt. Mugu
CA 93042

James Gallagher, Head
Optical Instrumentation Section
P.M.T.C., Pt. Mugu
CA 93042

Jet Propulsion Laboratory
California Institute of Technology
4800 Oak Grove Drive
Pasadena, California 91109
(818) 354-4321

JPL

December 5, 1984

James Gallagher, Head
Optical Instrumentation Section
P.M.T.C.
Pt. Mugu, CA 93042

Dear Jim:

I wish to express my appreciation to you for allowing me the opportunity to participate in the Controlled Impact Demonstration with Cast Glance team and the P-3 Orion U.S. Navy aircrew members.

LCDR Roberts and CDR Croll, along with Griesing, Adams, and Reed, are extraordinarily proficient and were very courteous to me as a guest aboard their aircraft, Nose Number 38.

You should know that John Gregoire believes the Optical Instrumentation Section from Pt. Mugu P.M.T.C. has the greatest "trackers and cameramen" in this world.

I am pleased to have had the privilege of becoming acquainted with members of the Cast Glance team during the actual test and dress rehearsal. I was very impressed with all hands.

They are quite a group of professionals.

Again, my thanks to you, the team, and the crew for one exciting mission to be remembered.

Sincerely yours,

P. Neuhauser

Philipp D. Neuhauser
Manager
Audiovisual & Education Office

cc: J. Gregoire
J. Hewitt

TO: JOHN GREGOIRE

FROM: GREGG HANCHETT

SUBJ.: C.I.D. DEBRIEF

November 29, arrived at Edwards AFB, set up station #11 video camera and recorder.

November 30, arrived at lake bed expecting to get out to runway 17/22 to set up camera and recorder at that site. However the tracker caravan to go to that site was not ready to leave yet so we went back to Dryden and set up the duplication center. After lunch, we made our way back out to the lake bed. The tracker crew was ready to go out to 17/22 now and we caravaned out to the site. While we were setting up our equipment, we heard over the radio that the remote hard line switch cable had broken. We had to go back to station #11 to pick up a cable any way so we said we would follow the cable back and repair if possible. We found a break and repaired it, however it still tested bad.

December 1, 06:15 arrived at fire station #2. Transported personnel and camera equipment to main fire station. Transferred equipment to the trucks we would be riding in. 07:30, Attended final briefing by Chief Bell and K.O. Smith. At this time they were still expecting little fire, they were going to roll only half of their equipment. They cautioned the crews to be careful and act professional. Everything would go as planned and

rehearsed. Cory and I would be riding with Chief Bell as in the dry run, following the trucks. Great emphasis was placed on the warnings that the photogs were to stay behind the fire trucks. 08:00 emergency C-135 landing with one engine out. Delay while trucks roll to stand-by for the landing.

08:15, C.I.D. fire truck caravan rolls to it's stand-by point at the end of the Barrier runway. 09:05, Boeing 720 takes off. 1000 feet cue over the radio. Fire trucks roll toward crash site camera on, v.c.r. on. It's at this time that we discover the the cause of the video "glitch" encountered on the dry run. The culprit is one of the chiefs radios. Contrary to the dry run, Chief Bell is in the lead. 90 seconds after impact he drops Cory and I off before the rest of the caravan arrives. At this time the air plane is almost completely hidden by heavy smoke pouring out of the bottom and the break in the fuselage behind the wings. A large puddle of fuel is burning toward the left, rear of the plane. The ragged edge of the right wing is glowing white hot just forward of the puddle. We are between the burning plane and the fire trucks, again, not as rehearsed in the dry run. Cory and I spent the next 90 minutes circling the wreckage of the plane trying to show "the survivability of this controlled impact demonstration", slipping and sliding along with the firemen in the mixture of foam, fuel, hydraulic fluid, oil and mud. The boots recommended proved to be of little use as far as traction is concerned.

10:45, We have used all of our tape and batteries we meet Steve at NASA 25 and depart the scene.

0530 Arrive at NASA Fire Department.
0600 Depart to A.F. Fire Dept. with K.O. Smith.
0615 Meet Cheif Bell at A.F. Fire Dept.
0700 Fire Crew briefing
0730 Assign photogs to trucks, prep gear, etc.
0800 Roll out on emergency landing
0830 Roll out to holding position
0900 T-1000 ft. roll out to approach plane
T+90 Sec. arrive at crash scene.

Upon arriving at the crash scene, I was very surprised at how close the truck I was riding in parked to the left wing fuel tank. I did not feel altogether safe, yet because the blaze outside ws so large and so close, with leaking fuel covering the ground, I decided to stay in the truck until the flames were knocked back some. It took about 4 or 5 minutes before I felt that I could safely leave the truck, even at that I felt fairly vulnerable in only a romex jump suit.

I was very impressed with the manner in which the fire crew attacked the blaze - as if they were going in to rescue real people. Dispite the fact that they could not extinguish the fire, the men gave it their all.

Aside from the heat and the size of the fire, I was amazed that the amount of smoke actually cut down the light by 2 stops. In a certain respect the scene from the standpoint of a participant was almost like being in a winter storm. The halon covering the jet and ground looked very much like snow and the black smoke obscured the flames and cut the light down to the level where it would be during a snow storm. Except for the heat it had a very wintery feeling.

After departing the truck I found it fairly easy to work. We had previously discussed the limits of my mobility with Chief Bell and I felt that comforming to his requests did not hamper my work.

The main difficulth in working came from sloshing around in fuel/halon mixture. It made it impossible to set equipment down and and while trying th change lenses and juggle film backs I very nearly dropped some. That would have put me out of business for the day.

All in all I felt I was able to perform my duties adequately and without any major interference.

Tom Wyman

TO: John Gregoire

FROM: Gordon Maughan

SUBJECT: CID De-Brief

December 1, 1984, reported to K.O. Smith at fire station #2 driver to main fire station by K.O. Prepared camera equipment and load same on fire truck. Attended final briefing by a very confident Chief Bell, great emphasis was placed on warning the photographers to stay in the fire truck until told it was safe to dismount. This word was never received! Dismounted when fire trucks ran out of foam and water and were returning to station to refill.

Fire trucks rioll to CID stand-by area, wait for 1000A cue. Cue fire trucks roll to crash site with Chief Bell in the lead off loading photographers Cory and Gregg within 50' of crashed airplane fire, nad ahead of arriving fire trucks contrary to all instructions given at the briefing earlier that morning.

From my viewpoint frm inside the fire truck as we approached the plane crash the area seemed all aglow. Cory and Gregg already filming. The fire fighting looked by the book for the first 15 minutes. Then an area slid section of the airplane could not be put down and that section continued to burn allowing for much great photography to the place and for the crashed airplane to completely burn itself inside and out. The pohto assignment I had was very exciting and a very good life experience.

I feel that all photo people involved with CID and the Director of PHotography, John Gregoire, did an outstanding job.

TO JOHN GREGOIRE SEC. DATE

FROM C. BORST SEC. EXT.

SUBJECT CID THE REAL STORY

It was a cold dark morning as we arrived at Fire Headquarters. K.O. Smith's teeth glittered as he approached us. "Good day for a crash." We nodded in agreement. Only the stars in the sky shone during the drive to Station 47. Frostbitten hands pulled the euipment from the truck to it's new resting place. Nervous laughter pervaded the atmosphere as the firemen went through the motions of checking apparatus. "Smoke if you got them" said Chief Bell as he walked the halls, and he seemed to have them all. Years of experience were carved in his face as he again reminded the photographers, "If I'm not back here drinking coffee in 45 minutes, I'm not doing my job." We breathed a sigh of relief knowing that he was leading us.

Gordon Maughan was busy checking out his equipment as I walked over to him. "what's the banana for, some sort of esoteric shot?" "No, lunch." I laughed at Gordie's facade of 'cool' as he dropped another filter. "drat, well John's got a large account number." The E-3's were inspecting the ever failing engine for the fourth time as the experienced rescue riders hungrily swallwed the slop they called 'grub', "Just another job."

The red sunpeeked through the clouds hanging low over the mountains. "Reminds me of Pearl" remarked K.O. "Listen up greenhorns, last briefing in 5 minutes, upstairs. You too, paparazzi." We followed Tom Wynne as he led the way in the search for the stairs ."This way hackers"we heard as we ended the third lap around the building . Soft-cheeked kids sat

MEMO

TO ______ SEC. ______ DATE ______

FROM ______ SEC. ______ EXT. ______

SUBJECT CID: THE REAL STORY

next to grizled veterans as all eyes focused on Chief Bell. "Now you've all been through this before" he started as he again languised over the details already engrained into everyone's heads. He again warned the photogs about where & wherenot to be. "If they get in your way, spray them" were his final words as we shook at the thought of being turned into a giant pile of Foamy.With that we heard "Gentlemen start your engines." We rushed downstairs(we knew the way now) to our waiting positions. We found Gordie by the door combing his moustache and twirling his hair, "It's not the mission, but the waiting that gets you."

T minus 90 minutes. Intruders on CID Site. Tom let a bitter smile break across his face, he had been working to long, too hard to let some misguided reporter ruin it now."Photo 9 to the rescue!" cracked the radio. " Photo 9, where the hell is secutity?" Bellowed Tom. "John, you got your ears on?" No one answered, we were all alone. The silence was deafening when a full alarm rang through the station. A plane with one engine out coming down, all trucks respond. With that Tom and Gordie shanghaied aboard two engines while Gregg and I ate dust. "A bad omen" remarked Chief Bell as he came across with another witty remark.

The plane landed without mishap as the trucks roared back just in time for rollout. T minus 60 minutes. "All aboard" Everyone loaded into the trucks as a warm wind blew in from the west. Our yellow suits clashed with the silver clad firemen. We chuckled at their discomfort as we knew there would be no fire, no need for warm heavy padding, safe as in your mother's arms we could still here Chief Bell saying.

The trucks rolled across the runwaysas clearances rolled in from the tower.

TO SEC. DATE

FROM SEC. EXT

SUBJECT CID: THE REAL STORY(cont)

The weekend traffic was light and everyone was expecting the inevitable. We arrived at our kickoff point in less than fifteen minutes. Again there was the waiting, the infernal waiting. Everyone tried to get through it as best as possible. Photographers took useless stills, rescuers tinkled with equipment and firemen tinkled on equipment.

Off into the distance 'it' stood. Looking like a PSA jet gone mad with smiles 'it' melted into ground with the heat rising making it a mirage to thirsty audiences. The long zebra had ants crawling all around it's body like the soon to be dead carcass that it was. T mimus 20 minutes. Another hold. Last second checks. More people in the wrong place. The wait was beginning to show even in the faces of the veterans. K.O. Smith was losing his identity. Running around with half a fireman's uniform and a camera he looked like Capt. Video. Unnerving wasn't the word for it.

Suddenly came the shout, "De Plane, De Plane". Everyone's eyes were focused north. The giant, striped torpedo was lumbering toward us. The time had come. Encouragement came from the fans on the sideline. Go, Go, Go. On it came. Longest runway in the world, and yet was it ever going to get off the ground? "It's not going to make it" said aviation expert Bell. All eyes followed it as it rose past our position. As graceful as a flamingo taking off it flew off into the distance. We watched it disappear as thoughts of "The Twilight Zone" came to mind.

Over the UHF radio distances & altitudes were being called out. We were waiting for our magic number of 1000 feet. Waiting eyes searched the skies for the returning dot. 2000 feet cracked over the radio. Everyone was at their positions, engines beating, hearts revving. I smiled as I looked around me. Who would crack first? Ybarra, our driver? Chief Bell? An E-3? I didn't count Capt. Video in the other truck. 1500 feet.

jpl

MEMO

TO JOHN GREGOIRE SEC. DATE

FROM C. BORST SEC. EXT.

SUBJECT CID: THE REAL STORY (cont)

Boys would become men today. I doubled-checked my equipment. Right filter, auto-iris off, cables snug. 1200 feet. A bead of sweat broke on my brow. Would this be the real thing or would it circle around several times as Tom had hinted? Should have made a pool bet on time of crash. 1000 feet. The trucks started to roll. Kicking up dust as we started across the lakebed the vehicles sounded like a Chicago thunderstorm.

750 feet. Camera on and rolling. I asked Gregg about sound and he said there was sound. An engine passed on our right. The plane was now visible above it. 500 feet. Would this be it or would we be treated like a yo-yo several times around. Now there was only one number to listen for. At 150 feet there would be no turning back. No touch and go's it would be the real thing. No time for water in the knee, jelly in the belly, strained voices. This would be a time for men. 150 feet! Get your ears on Photo 1 we're going to do it. We could see it clearly now. It looked through the viewfinder as if it was warbling some. We are thunderously racing toward it now and it's crashing and burning and on fire, oh the humanity! It's stopped sliding now and it's smoking and bunning and as we near it the sun disappears behind a cloud of smoke as if the Gods above rendered their disppointment. It is a blackened hull as we arrive on the scene, but wait a minute. As we get out I notice that something is different from the way we had rehearsed it. Where are the fire trucks. Here we are 30 feet from a burning inferno and nary a drop of water. Flashes of four fire trucks broken down on the lakebed enter my mind as I turn around to see all four charging at us at breakneck speed. Is this Chief Bell's way of getting us for not smoking. We quickly side-step the trucks as we remember the warning not to get in front of the fire trucks. However nothing was said about arriving ahead of them.

JPL

TO JOHN GREGOIRE SEC DATE

FROM C. BORST SEC EXT

SUBJECT CID: THE REAL STORY(cont)

As the trucks arrive on the scene foam is spilled onto the runway. Some of it manages to find the plane, but it is apparently too late. Three fingers have already gone under the water. Not much could remain of those dummies but charred remnants. The firement fight valiantly against breakdancing and the fire. I shoot a surviving tire that was thrown clear keeping in mind John's goal. We ask it some questions about the crash and then return to the firefighting. We join Tom & Gordie who have finally escaped from the truck they were held captive. Gordie goes off into the distance to cover us covering the fire, muttering something about keeping his boots clean. Tom stays with us darting between fire trucks getting the gruesome stories. A man goes down Tom rushes to get the details. I'm still trying to look for survivability factors. A plane wing glows white hot. Pool fires all around. Smoke billowing from plane windows. And the awful screams of those dummies. The firemen stop for a moment. Are they quitting? Are they going to let it burn? No, they're out of foam. Another fire truck bites the dust and they"re still no closer to putting it out. As soon as they put out one hot spot another starts.

Crash plus 90 minutes. We're finally able to get close enough to look inside. Dust to dust, ashes to ashes. No more store windows for these dummies. No more death rides in Mercedes. A blackened hull with blacker remains. Gregg points out a tire fire under the wing we're standing on. Moments llater they douse the flames. Chief Bell is 45 minutes late for his coffee. We see the vultures in the distance waiting to pick the bones of the burned hulk. Can't it rest in peace. Hey, dummies are people too. I walk over to John and ask him about further assignments. We're finished shooting he says until FAA says otherwise. As I start to walk back to the

TO JOHN GREGOIRE SEC. DATE

FROM C. BORST SEC. EXT.

SUBJECT CID: THE REAL STORY (cont)

plane to help Gregg bring over the equipment a Guard stops me and asks for ID and my business on the crash site. "Out of my way rookie a man is coming through."

THE END

JET PROPULSION LABORATORY

INTEROFFICE MEMORANDUM
SLB- 65-84

December 10, 1984

TO: J. D. Gregoire

FROM: S. L. Bridges SEC: 183 MAIL: 186-AUD EXT: 6170

SUBJECT: **Notes on My Part in the CID Photo Coverage**

November 29, 1984

We, Cory Borst, Gregg Hanchett and myself, loaded one JPL van and one JPL hatchback with our three cameras, tape recorders and supporting equipment. Traveled directly to the crash site and set up the Norelco TV camera at the north end. We could not get to 17-22 that day, but made arrangements to travel out with the tracker crew on November 30 in the morning. We stayed at the Sand Sailer in Lancaster.

November 30, 1984

We returned to the crash site about 8:00 am. We found that the tracker camera people would not be ready to set up 17-22 until that afternoon. We went to Edwards and refueled the vehicles. We then proceeded to Dryden to set up the video duplicating center. Had lunch. Met Marian Manese, who drove out that day, and got her badged in and obtained yellow suits for both Manese and Hanchett.

Proceeded to the crash site. Met the tracker people. Since we had the only vehicle with a cigarette lighter outlet to power the radio for tower communications, we led the convoy out to 17-22. Set up the second Norelco TV camera with a 60-600mm lens, one Sony 2860 videocassette recorder, and support equipment. Also setup a 19" color monitor on a stand for the command truck.

We conducted tests on the "hard line" for triggering the cameras at the site. The line was not working. We followed the line back the site and found a break about 1/3 the way from the site to 17-22. Apparently, the line had been caught on a vehicle traveling west and dragged until it snapped. Gregg Hanchett repaired the break, but further tests were negative. Tom Wynne thought it might be a problem in the relay. Tom decided to trigger the cameras in another way.

We tested the 17-22 Norelco system and found the videocassette deck was not operating properly. We decided to bring out one of the duplicating recorders to back up the errant recorder. We left for our lodging and attended a readiness meeting at the Essex.

December 1, 1984

Gregg Hanchett and Cory Borst drove directly to the Base fire department.

Marian Manese and I went directly to the impact site. We arrived at dawn and checked out our camera system at the north end of the site. We traded vehicles with one of the people who was on the final evacuation since they had to have a government vehicle for that maneuver. This involved the transfer of a fair amount of equipment from each vehicle. At about one hour before the crash we made final checks and adjustments on the camera and proceeded to 17-22 on the early evacuation.

At 17-22, we completed the setup, adding the editing deck. Marian watched the camera settings and I operated the camera. Shot some local scenes. Recorded the take off, starting with a close-up of the front of the plane then pulling back slightly as the plane began to roll. I was able to track the plane most of the way. Before impact I was on a slightly widder zoom angle. I went as tight as possible at we I could include the ground and the plane in the frame at 600mm. I continued to record for about ten minutes after impact. We had to stop recording in order to get Marian, the master tape and the editing recorder on a truck direct to Dryden.

I found that a 600mm lens on a 1" Plumbicon camera (about the same aperature as a 16mm film camera) is just about as much telephoto that can be reasonably hand tracked in this set-up. Foot movements, as I walked around the tripod, and heart beats caused some uneven movement of the head.

Marian made some copies of the tapes that she had and left the facility to start her vacation.

I loaded our site 17-22 equipment in the van and led the last convoy out from 17-22 to the CID site about one hour after impact. While waiting to get permission to go in and pick up the rest of the equipment I transferred the 17-22 equipment back into our original JPL van. I then picked up the station #11 equipment and the tired video camera crew, Gregg Hanchett and Cory Borst.

We, Gregg, Cory and Myself went directly to the duplicating center and proceeded to make copies of the available tapes and logged the masters in with the guard. It was obvious that the load was too great to finish in one day, It was decided that Cory would volunteer to stay on and finish the duplication work on Sunday, December 2. We left Dryden about 5:30 pm and after a quick change went to the reception and had lunch.

In all, I feel that things went very smoothly, considering the magnitude and complexity of the project.

JET PROPULSION LABORATORY　　　　　　　　　　INTEROFFICE MEMORANDUM

December 12, 1984

TO: John Gregoire

FROM: W.J. Hornaday

SUBJECT: Critique of the CID exercise

The following comments are offered concerning the results and conduct of the CID exercise.

Infrared imaging of the impact event & the initial stage of the slide was obtained with the FLIR 2000A imaging system. Our participation in the exercise was not without problems however. The position on the lakebed designated for our system was too far for optimum use of the wide field of view and too close for the narrow field of view. However, to really take advantage of the wide field of view the camera would have been perilously close to the impact area.

Three equipment related problems developed prior to impact. The battery in the Sony monitor failed and required an onsite modification to the power supply. Also, the FLIR gel cell power supply went into a low voltage mode just minutes before the late evacuation. Fortunately a back up battery was available. The most serious problem was the apparent glitch in the azimuth gimbal. Upon returning to station 21, the camera system was found to have been rotated about 7 degrees in a clockwise direction with the result that the initial fireball and secondary fire were missed. This occured after the initial late evacuation and before the second late evacuation. When the late evacuation was aborted and we returned to station 21, the video tape was rewound but the camera position was not checked due to time limitation.

The results that were obtained were not as good as we desired but some useful information should result in the imagry especially if the video data can be subjected to false color and contrast enhancement. We were also able to insure the success of the Kodak Spin Physics effort by making last minute changes in their camera aperture F-stop. As for the conduct of the exercise itself, there were some difficulties with relay of information as to times, evacuation stations, and access requirements. However, this exercise required the precise coordination of personnel and equipment from many organizations within and outside JPL. I would like to commend you, John, and also Toni Burke for successfully engineering this historic event. I would also like to document the outstanding support from Bob Hagood, which was essential to the success of our participation in the CID exercise.

WJH:vc

cc: T. Burk (photolab)
S. Glazer (354)
M. Herring
R. Hagood
D. Juergens
P. Swanson
J. Wellman

CID PHOTO NOTES FROM TERRY FAIL

SET-UP DAYS: We would have been very handicapped without the NASA van. We used it to go from station to station, cleaning, loading, shutter changes, filter cutting, and installing, scribing film, putting on time to frame references. Especially since this was done twice due to film changes.

FRI. 30 NOV It was a bum deal that the trip wire to 17/22 did not get checked till about 1500. So much for the back up system! We felt it should have been checked Thursday or Wednesday at dark Friday there wasn't much we could do the change the JPL cameras.

SAT. 1 DEC We found out that the man VAFB shorted us, hurt out set-up at 17/22. We needed one more man on the early departure to the manned mount. Nothing serious, but too many things didn't get done on the set-up until 0845 - 0900. Too late and too hurried.

SET-UP Since the 35mm ECN items seem to have been so valuable (the quality is excellent) it would havbe been nice to have had the right film perf. So we could have used the 4-E cameras at 300 fps at originally planned.

SAT. 2 DEC Really, we did it som many times that the morning set-up, the checks, the finals, just everything went smooth. We actually did a lot of standing around waiting for departure time.
Thank God that the coordination and the countdown went better than any practice day. Yes, there were minor problems encountered but, we had seen them before on practice days so, they weren't a big deal.
Stuart did good on Saturday he had his fuel and he didn't bug us. He even brought donuts!
At the van (C-7) everything went mooth, the 3 radio frequencies helped alot, the interference problems were minimal.
We would have been dead without the work radios.

POST-CRASH The station tear down went well. We used the C-7 van for down loading, labelling, and bagging. The only problem encountered was with the security cops and their stupid ropes.
The lakebed was stripped of all Navy and Air Force equipment by 1530, and packed somewhat by 1630.
A Long Day!!

C.I.D. Impressions

Carol L. Lachata

December 1, 1984

5:30 A.M. : Drive to Antelope Valley Inn (Visitor's center)

6:00 A.M. : Board buses with "Technical Observers" to go out to site.

6:15 A.M. : Buses leave for site, 4½ miles northeast of Rogers lakebed. Group in good spirits. Chatted with a representative from Fairchild Corporation, developer of flameproof material used to prevent plane seats from igniting.

8:20 A.M. : Arrive at observation site. Photograph "Technically interested" visitors.

9:10 A.M. : Impact. I was surprised that I couldn't hear any sound upon impact.

9:20 A.M. : Board buses for trip back to Dryden. Group considerably more subdued; everyone seems to be wondering what happened, as we observe the plane still burning during the drive back.

10:30 A.M.: Arrive at NASA/Dryden. Have coffee

10:45 A.M.: Reload buses for close-up observation of crash site.

11:15 A.M.: Arrive at CID site. We are not allowed to leave buses, but circle around the plane, which appears almost totally devastated.

11:30 A.M.: Buses leave to go back to Dryden.

12:10 P.M.: Arrive at Dryden. I go immediately to the Press room, where the Press conference has already begun. Photograph officials from NASA and the F.A.A. while the press questions them. From my observation, the Press seems to want to write a conclusive story on whether the crash was a success or a failure, and doesn't appear all that interested in the shades of gray in between.

1:00 P.M. : De-briefing for "Technical observers". Photograph this conference also.

[redacted]

ADVANCED TECHNOLOGY DIVISION
23950 CRAFTSMAN ROAD
CALABASAS, CALIF. 91302 (818) 999-1393

SYMBOLIZED SYSTEMS, INC.

December 14, 1984

Mr. John Gregoire
Jet Propulsion Lab
4800 Oak Grove Dr.
Pasadena, CA 91103

Dear John:

Please find enclosed a series of five photographs taken off of our video film printer, the VFP7111. I am sending you these pictures because I feel the majority of them show the source of ignition on the CID plane.

Photo #1 and Photo #2 were taken from the same camera position. They are successive video frames. This camera position was number 11 directly looking into the oncoming plane. You can see at the engine position closest to the fuselage the source of ignition and it continuing to spread in Picture #2.

Picture #3 is taken off the video tape from the Norelco studio camera located at 1722. This photo also clearly shows the source of ignition right parallel the fuselage where the wing connects.

Picture #4 is off of the cast glance camera and also shows ignition at the same location.

Lastly, we have a print off the Spin Physics unit SP2000. Again, showing the ignition coming from behind the fuselage from this view.

John, I have also enclosed two photographs that were taken at one of the early dry runs. This was the dry run that the management people from JPL came to and I snapped these two pictures. I thought you may be able to utilize them in some PR manner.

Overall, I was extremely happy with the results from the video tape. We got some excellent images and pretty much all of the cameras functioned correctly. The only place we had problems were at two locations-- one of the shutter servo boards would not lock to the generator and in the other position the VTR apparently did not lock to the generator. So my only major suggestion would be that we do have some isolation transformers available for any other future tests of this type.

3231 W MacArthur Blvd. Santa Ana, CA 92704 • (714) 540-1024 • Outside Calif.: (800) 854-3278 • In Calif.: (800) 432-3191

[redacted]

Again, I am really excited about the outcome of the video tape. I would appreciate your letting me know when we can release some of it or when it has been released. I look forward to working with you on other things such as this.

Sincerely,
ADVANCED TECHNOLGY DIV.

Jon N. Nagy
V.P. Marketing & Sales

JNN/SF

Enclosures

VISUAL INSTRUMENTATION CORPORATION

903 N. VICTORY BLVD. BURBANK, CA. 91502 818 843-5311 TELEX 68-6432

DATE: January 7, 1985

MEMO TO: John Gregorie, JPL

FROM: Gil Pendley

SUBJECT: HIGH SPEED PHOTOGRAPHIC COVERAGE OF CONTROLLED IMPACT DEMONSTRATION AT EDWARDS AIR FORCE BASE, CALIFORNIA.

On December 1, 1984 Visual Instrumentation Corporation provided and operated one portable tracking system equipped with a single 16mm High Speed camera. This system was located at Site C-7, which is approximately 5 miles from the impact point.

The tracking system performance details are as follows:

CAMERA TYPE:	Locam 16mm, pin-registered high speed with a shutter opening of 140 degrees.
FILM TYPE:	Kodak Ektachrome type 7251, 16mm x 400', ASA 400.
CAMERA SPEED:	400 frames per second.
CAMERA SHUTTER SPEED:	1/1,000 second.
LENS FOCAL LENGTH:	1,000mm telephoto set at f/8.0
TIMING:	IRIG-B serial time code was provided by a true time satellite receiver and was connected to the tracking system for the duration of the test.
DATA ANOTATION ON FILM:	IRIG time and Azimuth & Elevation data was recorded on each 16mm film frame. Data is recorded in direct reading numeric form at the camera aperture without displacement or parallax.
DATA RECORDING MATRIX:	A 15 character, Hexadecimal, LED display is utilized and is optically relayed to the camera aperture.

MEMO TO: John Gregorie, JPL
SUBJECT: Photograhic coverage of
DEMO at Edwards AFB, CA

Jan. 7, 1985

DATA FORMAT ON FILM: 39 consecutive film frames record the following data:

AZIMUTH: 5 digits
ELEVATION: 4 digits
TIME: 6 digits, to 00.0001 sec.

A full 10 digit IRIG print out is recorded every 40th. film frame, to: 23 hours, 59 minutes, 59.0001 seconds and 5 digits of pre-set data.

AZIMUTH & ELEVATION DATA: AZ data is prefixed by the letter A and EL data by the letter E or d which represents elevation or depression, above or below zero degrees.

EXAMPLE: A 257.5 degrees
d 007.8 degrees

CALIBRATION: The tracking mount was leveled to 0.5 degrees. Two range targets, for site C-7, along with the center line of the fixed theodolite were used to align and calibrate the portable tracking mount. Alignment accuracy is within ±.2° of the Azimuth reference for site C-7.

The camera was started at: 09 hours, 22 minutes, 04 seconds and ran successfully for the entire 400 ft. film load. Post test film review confirmed stable tracking and camera performance with acceptable image size, focus and exposure. A slight bluring of the outboard column of the data matrix (Azimuth) is evident and was caused by running the camera at approximately 100 fr./sec. above the limit for the software controlled data recording interval. However, acceptable Azimuth data can be extracted from the film.

Film processing was done by FOTO-KEM of Burbank, CA at the rated ASA of 400. Forced or pushed developing was not required. Film original was released directly to JPL. The enclosed photographs and data sheets will provide further performance details on the portable tracking mount system.

Respectfully submitted,

G.J. Pendley
President

VISUAL INSTRUMENTATION CORPORATION

903 N. VICTORY BLVD. BURBANK, CA. 91502 213 843-5311 TELEX 68-6432

AV-84B DESIGN PHILOSOPHY AND OPERATIONAL CONSIDERATIONS

The AV-84B system is designed to fill a need which exists between a basic tripod mounted instrument camera and todays sophisticated fixed or mobile tracking mounts.

The design goals were very clear; condense the fundamental performance characteristics of the large tracking mounts into a simple, manual and low cost system that can record pictorial information, Azimuth & Elevation, IRIG time and other data on film or video. And, retain portability and ease of operation which allows one person to set-up and operate the equipment in virtually any location.

In order to achieve the stated goals the AV-84B's final configuration represents a systems approach in which its design carefully balances 3 major factors:

1. Portability
2. Reliability
3. Accuracy

True portability is achieved due to the system's very low power consumption. Minimum power needs also enhance overall reliability, as a small 30VDC battery provides power to the entire system, including a 16mm film camera. There is no need for AC power and/or field generators with their associated line noise and voltage spikes. Unique, Hi-G, electro-optical shaft encoders (non-glass) are utilized to generate the AZ-EL data to the specified accuracy. All system components are designed to withstand the rough handling and environmental extremes encountered under typical weapons test range conditions.

V.I.C. has organized the various electronic functions under micro-computer control with software instructions stored in program read only memory (PROM). Operational flexibility is almost unlimited by adding to or changing the pre-programmed instructions. The AV-84B system will handle multiple payloads of film or video cameras and/or other devices such as laser designators. It also will provide all necessary signal processing, electronic control, video character generation etc. within the onboard micro-computer electronic interface unit. The accompanying data sheets will provide detailed performance specifications.

LAST DAYS OF CID
BY TONI BURKE

Nov 27, 1984 (Tuesday)

I was headed for Ames/Dryden. Gordon had picked up my car, Bob Hanson showed me how to fill out my travel ticket; and I made several trips in and out of the photo lab to carry papers, pencils, copies, lists of lists, reservation lists; and everything needed for a fun day on the lake bed. Everything was thrown on the seat. Gordon loaded the forgotten cameras and I got in the car. "Line 1; Toni Burke.(It Stewie Glazer.) "How's everything going?" I answer, everthing is fine and I'm leaving now and I'll see you there." Stewie is calling everyday now. In the car again I hear "Line 2; Toni Burke." This time it is NBC. "I would like to talk to the man in charge of photography, Mr Gregory." I directed him to NASA PAO. In the car, again I hear my name on the intercom, this time it's Gregoire. "Where is all the contract information? I need the agreement written by Westfield; it's a rough draft." Between Gordon and I, we finally located and added it to my growing bundle to take to Ames/Dryden. John Hewitt arrived and I informed him that there was still some dispute about the deliverables and how the original data will be handled. As we read the contract draft on the trunk of NASA vehicle, another phone call from Vandenberg Air Force Base requesting their money. I told them the check was in the mail (almost). Another phone call from one of Gregoire's acquaintances asking him to arrange a seat to watch the plane crash. After I tried desperately to tell him that it couldn't be done and tried hard not to yell at this point, I calmly suggested that I could arrange a seat on the plane. I finally arrived at my destination late Tuesday to see Gregoire's cheerful face. His only reply was "Well, everthing is going great and there's so little to do you could have stayed in Pasadena another day." Thanks a lot John, I'm getting away to rest.

Nov 28, 1984 (Wednesday)

Up early to run. It's 22 degrees outside; no running for me. Breakfast with Gregorie and off to Ames/Dryden. More hallway meetings. My right arm has grown larger from carring two full binders with copies of procedures, addresses and phone numbers.

Nov 29, 1984 (Thursday)

Readiness meeting with Barney and crew. It's a long and detailed meeting, there were some people falling asleep. I spent three hours with Susan getting the right badges with the right people, with and without mispelled names. I had a lot of talking to do to get early badges for the fire truck photo crew. I had to explain in great detail that they need their badges before the crash, not after the crash. Bureaucracy at it's best form - no one was allowed on the lake bed without at badge. In order to particiapte, NASA/DRYDEN badges were required, CID badges, then a car pass. I was going crazy trying to figure out who needs what and where. There were 56 names and each person had a certain task. I had learned almost everyon's name except for the last minute personnel changes that

that occured because of previous commitments or the last minute changes Gregoire had made. Gregoire was too busy to deal with the small stuff. Wrote all personnel lake positioning that night to give to Barnicki the next morning.

Nov 30, 1984 (Friday)

Early trip to Ground Ops. I needed more badges. Left Barnicki the new lake bed positioning. New requirements from PAO area. They have designated a new area (C-7). It will be the six mile area from the landing strip for photogs and press. All personnel are required to have:

1. NASA/DRYDEN badges
2. CID badges
3. CID car passes
4. C-7 car passes
5. C-7 badge
6. Working radios
7. Tower radios
8. Bunny suits (yellow)

Now this is really a production---Who has what, where, and when?

Gordon Maughan arrived from JPL. I had decided to stay at Edwards instead of driving to Century City for the Air Force Ball. John Gregoire took away all of my books and sent me back to Pasadena to enjoy my birthday and the Air Force Ball. He promised faithfully that he and Gordon Maughan would take care of all badges and any last minute changes and that there was nothing to worry about.
I went to the Air Force Ball had a wonderful time and drove back to Lancaster at 1:00 a.m. Too late to sleep. I called Gregoire and he was awake. He was still recovering from the auto accident he had been in as a passenger the night before. We sorted all the last minute problems, badges, cars, etc.

Dec 1, 1985 (Saturday) **CID DAY**

All the rooms at the Desert Inn were still while John and I worked diligently checking off lists of lists. Did everyone have their passes, badges, car stickers, C-7 passes, CID passes and everyting else required to proceed to the crash site? Be sure and call Tibby to wake him up to install the nose and tail camera.

Had breakfast with Stu Glazer. We drew him a map to the C-7 area. He needed a car. Last minute details; we had one of our valuable cars out of commission.

As I said "Good luck" to John, he asked me to buy donuts and go by the PAO office at 4:00 a.m. One more badge; someone had lost their's.

Trip to flight area for my bunny suit and radio. As I walked around the

dark corridors I lost my CID badge. Then, I rushed back to life support to have them help me look for my badge. I had strict instructions that if anyone loses a badge a duplicate would not be made. We used a small penlight to no avail. Back to PAO, to plead for another badge. Nancy made me another one, and asked me to move the lab car to a parking lot accross the street. It was still very dark and the shuttle to runway 17/22 has already left--time is running out -- the donuts are becoming a heavy load. A few times I had to defend them from a hungry crew. The folders have also grown heavier. As I hurriedly parked the car I noticed that the driveway had gotten considerably smaller; in fact, I had to drive very, very carefully in order to stay on the asphalt. As I parked the car and rushed to try and catch the shuttle, the donuts were dropped for the third time. (When I returned to the car later on during the day, I noticed that I had parked in the right parking lot, but I had used the pedestrian bridge for a driveway!) Off to the CID site. Through the same dark corridors and to life support. No shuttle. Now we need a special authorization to get me to the site. I had a new driver without a working radio to contact the tower. As we sat for a number of minutes while the radio was being repaired, I sat thinking over the events leading up to this morning. I wondered who I had let talk me into this. I could be home safe and warm, and not wondering if the plane would land on me. The radio is finally working, we proceeded to the crash site. This is new route for me, I need a seat belt to stay on the seat. It very bumpy and dark. The driver was not aware that the Santa Fe trail could be used.

Arrived at site 17/22. All crew aboard, Barney, Bob, John, and the structrual engineer. His task was to safe the plane for re-entry. As the sun came up, we munched on donuts and coffee and rolls and coffee and more donuts and coffee. I don't want to go to sleep as I had done on previous tests. John is in radio contact with all. Countdown has started. Tibby arrived with more donuts and coffee for NASA 27. We watch him install the cameras. Everyone is busy around the plane. Jack Dawson is filming all the activities, fuel mixing, and plane readiness. There is a call from ground control that a P-3 airplane will be making an emergency landing. Bob Hanson and Bixler are on the way to our area at the same time. After a brief pause, the emergency landing takes place. We continue the countdown. The engines have started; the the noise is deafing. Everyone is geared up. Barney speaks softly into his radio "Are you ready to support project?" John answers "Yes". The excitement is mounting. It's 5 minutes to late evac. Photo personnel leave CID site. We can see the helicopters. Then there is a delay everyone is ordered back to CID site to disarm cameras. **(How do you disarm the 50+ cameras?)** Two minutes later, the order came "Turn cameras on," It was a Keystone Cops series on the lakebed. The doors are closed on the 720 and personnel have left-one last kiss to the striped monster. We are cleared for take-off, the nose chock is removed and ready. Then another hold. Unauthorized personnel. Chocks are put back. The noise in NASA 25 gets louder with high pitch voices and quick decisions. Barney's calm voice is no longer calm. A hush falls over the van. No one is speaking, only listening. The chocks are removed again and cleared for brake release. Take off at 0914. It was a sad

feeling knowing that the monster was on it's way to it's doom.
There was complete silence while we watched the airplane lumber down the runway. It seemed like it would never leave the ground. Seconds went by (they seemed like minutes). NASA 25 had repositioned and we had a good view of the crash site. The plane looked peaceful as she circled around and waved on last goodbye before impact. The impact was brutle. The wing immedietly was torn by the can openers. Flames were spewing out of the starboard side. For a quick flash the flames seemed to subside then burst again with no let up. NASA 25 was on site at 0926. Flames were everwhere. Smoke was billowing from all parts of the plane. The fire trucks were spewing the foam and our camera personnel were in the fire trucks and out of the fire trucks. They were filming everthing. No one had said a word; all we could do was watch, while the fire engines roared back and forth.
Gregoire asked all photo personnel to continue filming. Photo 2 answered "everthing looks good and we have data." All the yellow suits are filming the action but, one suit is missing, where is he. The ambulance arrives. Where is the missing camera man? We see him now. We found out later our camera crew had strict instructions to stay in the fire truck and our Gordon has followed their instuctions to a T. Barney barks orders. No one is to move while the plane is burning. A call from John Hewitt in the C-7 area. He wanted to know when the rest of the camera crew can get their camera's. We get the OK to pass out the last CID badges. It is two hours later before the fire was finally put out. There were twelve firemen injured.

We packaged and delived all materials. Everyone was glad CID was over including me. It was nice to be home week-ends and to work a 40-hour week. The next morning,in the rain, the on-board cameras were removed. The film had survived the impact and the fire! The photo support team was successful.

NOW FOR THE REPORTS - REPORTS - AND REPORTS

Comments on CID Test (Bill Shipman)

1) Initial contact with the Naval Surface Weapons Center, Dahlgren, VA, was made to determine if photographic instrumentation support for the CID test could be provided and at what level. It was agreed that NSWC could supply a remote control turn-on system, to activate approximately 75 cameras, from a distance of 3 to 5 miles, through a radio controlled link. It was also considered at this time to provide a remote control system to operate a cine sextant tracking mount (so it could be located close to the action and provide high quality photographs) and a microwave video link.

Some reservations were displayed about these systems as they are not normal off-the-shelf items but rather a state of the art capability. Because of this a demonstration of operation was agreed upon.

2) The cameras and tracking mounts used for the CID test were being supplied by Vandenberg AFB, CA, so it was decided to take the control systems there for a demonstration. When this occurred the frequency management team from VAFB was there to monitor the frequencies of the control units to verify there would be no interference with other systems. Well there was. They requested a change of frequencies and a tune up of a second frequency.

3) After the requested changes were made, another demonstration was conducted at VAFB. At this time all systems operated as expected. The tracking mount was taken into the field and operated successfully from a control van located some 5-miles distant. The camera control unit operated every time, as expected. Success was ours and we were ready to support the test.

4) The next step was to transport this equipment to Edwards Air Force Base, CA, and set up a demonstration at the actual site. Well things didn't exactly go as planned! The first problem was in selecting a location for our control site. To be a sufficient distance from the safety zone required us to locate 6 1/2-miles away at a location that made visibility to the test site questionable at best. However, the test went on. The normal problems were encountered and conquered, i.e., shortage of generators for power, making compatible cables, building camera towers, and the never ending check-out.

5) The next request was for a backup system. This had to be fabricated at NSWC. So the team (W. Shipman and H. McBane) went back to Dahlgren, VA, and began fabricating a duplicate system. This was completed and delivered to EAFB, and more testing began.

6) During these check-out procedures another problem was discovered. There was, in fact, an interference problem on frequencies. The Army was conducting tests in the area with an RPV that operated on the same frequencies as our control circuit. To work around the problem, it was decided we could operate at night and after normal

duty hours for our checkouts. This made for many long days of preparation. Next we found a problem with the camera control units! These units performed flawlessly many times before, and this problem baffled us and led to an exhausting investigation.

7) It was discovered that the signal reaching the receivers was very low. To solve this problem we purchased locally several high gain antennas, and again tried to checkout.

8) Coincidently, one of our engineers back at NSWC was working on a problem of a similar type. During conversation with him he suggested maybe we were experiencing multipath phenomena that is blocking the signal.

He did a computer model of the problem and suggested new locations for the antennas. Well, it worked! We learned something about working in the desert.

9) We were now ready for the final setup and test preparation. Because of the problems encountered and not yet solved, it was decided to string field wire acrcss the desert to provide a hard line back up to our questionable system. This would operate 7 still cameras. During these checks it was found that everything worked fine and we were ready for the dry run.

10) During the dry run another problem occurred. (These seem to happen all the time.) Because of the relay of the communications passing the countdown information, the monitoring of the count directly, and the camera set up being done by radio communications, we ended up with 4 radio channels to monitor. This became so confusing we bought a scanner to sort out who was talking on what channel.

11) Well the test occurred! The cine sextant tracked flawlessly, the television picture was transmitted beautifully. In short, all looked good! But we still had to go to the site to see if the cameras ran and pulled film. (Incidently, the hard wire back up turn-on system failed during checkout and these cameras were connected to the NSWC remote system about 4 hours prior to test.

12) When we approached the test area after the test, we were denied access. Even though we all had proper badges (a very elaborate system of badging was established) we were still denied access. After many frustrating minutes access was gained and camera sites checked. We were ecstatic, all items ran as expected. Every site received the proper signal at the proper time. The photographic system was a success.

13) Now the time came to tear down and pack the equipment. This was accomplished quickly and efficiently with many tired men working a very long day. Of course we celebrated - it was quite an accomplishment to do what we did, and do it with a high degree of success, in spite of the problems.

APPENDIX AA

CID
GROUND OPERATIONS
CREW BRIEFING
FOR
IMPACT DAY
1 DECEMBER 1984

CID

GROUND OPERATIONS

CREW BRIEFING

FOR

IMPACT DAY

1 DECEMBER 1984

CID DOF TIMELINE

NOV. 29, 1984

0330	GROUND CREW SHOW
0400	BEGIN EXPERIMENT PREFLIGHTS
0400	NASA 25 ON SITE
0430	AIRCRAFT CID SYSTEMS PREFLIGHT
0430	DEGRADER BLEED
0525	NASA 15 AT AIRCRAFT W. TIME CODE GENERATOR
0530	FLIGHT ENGINEER PREFLIGHT
0640	START 45 MINUTE HOLD FOR WEATHER DECISION
0725	CALL TO STATIONS AND TM TURN ON (0655)
0740	START MISSION CARDS (0710)
0800	START 10 MINUTE HOLD (0730)
0800	C-BAND BEACON CHECK AT SITE (0730)
0810	DEGRADER/ENGINE START (0740)
0830	BEGIN VIDEO TURN ON (0800)
0835	CHASE TAKEOFF FOR CID SITE CHECK (0805)
0850	START 5 MINUTE HOLD (0820)
0855	CREW EGRESS (0825)
0900	BRAKE RELEASE/TAKEOFF (0830)
0910	IMPACT (CID) (0840)

NASA 22 DAY OF FLIGHT TIME LINE

28 NOVEMBER 1984

0330	REPORT TO WORK
0415	LEAVE FOR CID IMPACT SITE
0515	CHECK CID IMPACT SITE AREA
0530	TURN ON GENERATOR AND LANDING LIGHTS (SERV-AIR)
0630	ALL EXTRA PERSONNEL LEAVE AREA, EXPECT EIGHT (8) JPL PHOTO PERSONNEL, TWO (2) SECURITY GUARDS/C-36 AND C-37, AND NASA 22
0640	CLOSE AND BARRICADE IMPACT SITE ROAD AT MERCURY BLVD. SECURITY C-36 AND C-37 (DANGUARD)(REPORT ACTION TO NASA 25)
0640	START 45 MINUTE HOLD FOR WEATHER DECISION
0800	(0730) "C" BAND BECON CHECK, CHANNEL 11, NASA 20
0800	(0730) START 10 MINUTE HOLD
0810	(0740) CHECK RUNWAYS 17 AND 25, REPORT CONDITION TO NASA 25
0845	(0815) PHOTO PERSONNEL TURN ON CAMERAS
0850	(0820) ALL PHOTO PERSONNEL LEAVE IMPACT SITE FOR 17/22 CONVOY AREA (REPORT TO NASA 25/PHOTO 1 WHEN ALL PERSONNEL AT CONVOY AREA)
0850	(0820) SECURITY (2), SERV-AIR (1), AND NASA 22 (2) WILL CHECK AREA AND DEPART FOR SOUTH BASE - JOIN UP WITH FIRE DEPT.
0852	(0822) CALL NASA 25 WHEN CID IMPACT SITE CLEAR OF ALL PERSONNEL
0855	(08250 CALL NASA 25 WHEN IN PLACE AT SOUTH BASE WITH THE FIRE DEPT.
0900	(0830) CID/720 TAKEOFF
0909	**(0839) IMPACT (CID)**
0912	(0842) TURN OFF GENERATOR AND LANDING LIGHTS
0920	(0850) TAKE SECURITY PERSONNEL TO IMPACT SITE ROAD AND MERCURY BLVD.
0930	(0900) REPORT TO NASA 25
0940	(0910) MARK PERIMETER OF WRECKAGE - SERV-AIR TO SET UP ROPE AND FENCE

National Aeronautics and
Space Administration

Ames Research Center
Dryden Flight Research Facility
P.O. Box 273
Edwards, California 93523

NASA

Reply to Attn of: OD

November 21, 1984

TO: Holder of CID Site access badge

FROM: CID Ground Operations Manager

SUBJECT: CID Site - Access and Personnel Safety Restrictions

Your entry to the CID Impact Site Operational Control Area and/or wreckage of the CID/720 aircraft shall be approved and coordinated by the Ground Operations Manager (GOM). While within the site you are under the supervison and control of the GOM.

Access of personnel to the CID/720 wreckage shall be limited to no more than twelve (12) people. Six (6) maximum within the aircraft and six (6) within fifty (50) feet of the main wreckage as determined by the GOM.

All personnel entering the site must have a CID Lakebed Access Badge. Badges will only be issued at NASA Dryden, none will be issued or kept at the site. Badges will be available from day 1 thru day 8, at the Public Affairs Office (Susan Ligon/Roger Barnicki). From day 9 thru the removal of the CID/720, badges will be given out at the ISF Security Post. No replacement badges will be issued.

All personnel entering within the fenced area of the CID/720 wreckage are required to wear "Nomex" (fire resistent) yellow coveralls. **NO SMOKING SHALL BE PERMITTED WITHIN THE CONTROLLED AREA OF THE IMPACT SITE AFTER THE 720 IMPACT/CRASH.**

Only vehicles approved by the GOM shall be permitted beyond the vehicle parking area (at the guard post).

Roger J. Barnicki
CID Ground Ops Manager

Concur:

Ronald S. Waite
Chief, Dryden Research
Aircraft Ops Division

Merle DeGeer
Chief, Safety & Quality
Assurance Office

National Aeronautics and
Space Administration

Ames Research Center
Dryden Flight Research Facility
P O Box 273
Edwards, California 93523

NASA

0 27 Nov. 1984

TO: Capt. Bob Guerrero/Danguard
THRU: Sam Miller/Dryden, Chief, Security,

FROM: Roger J. Barnicki/CID Ground Ops. Mgr.

SUBJECT: CID Security (Day of and after impact)

Charlie 36 Charlie 37	At CID Site: 24 hour coverage till A/C removed from lakebed
Charlie 38	Aircraft 24 hour coverage till impact day

IMPACT DAY:

C-36 & 37 - Stay at impact site.

C-36 & 37 - Will be picked up at 0700 by NASA 22 (Jim Edgeworth) and transported to So. Base or the 17/22 convoy area till after impact and then taken to Mercury Blvd. & CID Site Access Road.

C-39 & 38 - Go to Santa Fe Trail entrance to lakebed at 0330.

C-38 & 39 - Will stay at Santa Fe Trail until released (1 to 2 hours after impact).

C-36, C-37, C-38 & C-39 - **Shall stop and hold all personnel** - C-36 & C-37, at the intersection of Mercury Blvd. & CID site access road and C-38 & C-39 at the Santa Fe Trail, **until clearance is given** to enter lakebed or the CID site **by NASA 25** (**all personnel** shall be informed that they **must report to NASA 25**). NASA 25 is controlling access to the CID Site and aircraft, by Lakebed Access Badge and visual control.

C-40 - JPL Photo Site (C-7) start tour of duty as requested by J. Gregoire and then at 0400 impact day move to Media Site Access Road entrance (To control access by media only) up till 1 hour after impact (approx. 0930).

Roger J. Barnicki
CID Ground Ops. Mgr.

National Aeronautics and
Space Administration

Ames Research Center
Dryden Flight Research Facility
P O Box 273
Edwards, California 93523

NASA

OP August 24, 1984

TO: ODFL/Mr. Roger J. Barnicki

FROM: OP/CID Project Manager

SUBJECT: Appointment CID Project, Ground Operations Manager

You are hereby appointed CID Project Ground Operations Manager/Convoy Commander (GOM/CC) with the following scope, responsibilities and authority.

Ground operations for the CID program shall be defined as all activities and ground support elements participating in pre-impact, impact, and post impact activity within or operating at the perimeters of the operational control area for CID operations.

As GOM/CC you are responsible for coordinating, and providing operational control of all NASA, NASA Contractors, FAA, FAA Contractors (ie JPL, ICI, GE), and AFFTC/DOD personnel and equipment providing support for the CID as per the CID Ground Operations Plan, CID-84-23. This assigned task shall include all other personnel required on site while operating within the CID Operational Control Area, or personnel and equipment, not part of the convoy, which have need to operate within or at the perimeters of the CID Operational Control Area.

Beginning one week prior to the CID test until removal of the 720 carcass, as GOM/CC you shall contol, approve and badge all personnel entering the CID Impact Site Controlled Area.

As Ground Operations Manager/Convoy Commander (GOM/CC) you shall also act as the Contingency Operations Director (NASA On-Scene Representive) for mishaps within the CID Operational Control Area reporting to the Dryden Operations Flight Controller, or his representative in the ADFRF CID control room. For a mishap outside the CID Operational Control Area, you shall board a DOD/AFFTC helicopter and serve as Air Contingency Operations Director (NASA On-Scene Representative) reporting to the Chief, Dryden Research Aircraft Operations.

Responsibility for the CID/720 operations shall change from NASA 1 to the GOM/CC at aircraft impact. NASA 1 shall provide program support and coordination to the GOM/CC in support of the Ground Operations Test and Recovery Teams until mutualy agreed that support is no longer required. In the event of emergency operations as ground operations manager/convoy commander (GOM/CC) you will report directly to the Ames Dryden Chief, Research Aircraft Operations.

M. R. Barber 8/23

Marvin R. Barber
NASA ADFRF
CID Project Manager

Approve/Concur

R. Waite

Ronald S. Waite
Chief, Dryden Research
Aircraft Operations

Thomas C. McMurtry

Thomas C. McMurtry
Chief, Flight Crew Branch
Dryden Research Aircraft Ops.

CC:
O/M. Knutson
O/T. Ayers
OE/M. Thompson
OP/K. Hodge
DOD/M. DeGeer
DI/R. Jackson
ODT/L. Barnett
ODO/W. Albrecht
APS/S. Miller
FAA/J. Reed
Personnel File

3.3 IMPACT SITE ACCESS CONTROL

All entry to the CID Impact Site Operational Control Area shall coordinated and approved by the Ground Operations Manager (GOM).

Security control of the impact site shall be 24 hours a day, beginning one week prior to the CID until removal of the 720 carcass. (NASA contract security guards will be used for pre and post impact site security and access control) As this project will be conducted on USAF property and for safety and security measures, USAF Security Police will be posted at strategic points to form a protective cordon around the CID Hazardous Operations Control Area prior to (CID/720 Engine Start or -1 HR from take off) the CID/720 impact.

NO SMOKING SHALL BE PERMITTED WITHIN THE CONRTROLLED AREA OF THE IMPACT SITE AFTER THE 720 IMPACT/CRASH

Entry to the CID Impact Site prior to the interval controlled by security, personnel may enter the site (Fig. 4), by informing either Edwards Ground Control, by radio frequency 121.8, or Base Operations by telephone, 277-2222, upon entering and exiting the area. Entry to the CID Impact Site shall be from the Mercury Blvd. access point only. Use of the Santa Fe Trail by personnel shall be by the approval of the GOM or the Chief, Dryden Research Aircraft Operations Division.

Personnel entry to the CID Impact Site Controlled Area,beginning one week prior to the CID test until removal of the 720 carcass, shall be by CID IMPACT SITE PERSONNEL ENTRY BADGE **only**. Badges will be issued by NASA security office, ISF Lobby, when approved by the CID Ground Operations Manager (Mr. Roger Barnicki). Badges **will not be issued or kept at the impact site** and may **only** be obtained as stated above.

Airfield Communications/Access - All vehicles on the lakebed shall maintain direct radio contact with the control tower or be escorted by a vehicle with a radio. All lakebed construction and test site operations must be coordinated with Edwards Airfield Management at 277-3808.

Other than as stated above **all vehicular or human access to, or habitation on, Rogers Lake, requires continuous radio contact with Edwards Ground Control.**

3.4 SECURITY

The Security Police are charged with two primary responsibilities in support of the CID program; (1) Provide protection of the CID impact site and the area within the CID termination envelope boundaries, by limiting access to authorized personal only (AFFTC Security shall secure the impact site immediately after 720 impact until released by the OSC), and (2) provide traffic and crowd control and protection of AFFTC property. (NASA contract security guards will be used for pre- and post-impact site security and access control) (Fig. 4)

For both of these functions the Commander, Security Police, will respond to the On-Scene Commander. The On-Scene Commander may delegete the crowd control portion of this responsibility to the Commander, Security Police, if the situation warrants it, i.e. excessive activity in the CID Operational Control Area as well as in crowd control.

Security of the impact site shall be 24 hours a day, beginning one week prior to the CID until removal of the 720 carcass. (NASA contract security guards will be used for pre- and post-impact site security and access control) As this project will be conducted on USAF property and for safety and security measures, USAF Security Police will be posted at strategic points to form a protective cordon around the CID Hazardous Operations Control Area prior to (CID/720 Engine Start -1 HR) the CID/720 impact. (Fig. 5)

A minimum of (15) roving and fixed patrols will be used to prevent unauthorized entry within the CID termination envelope boundaries and onto the lakebed or near operational areas to afford protection of personnel and property.

On-base and off-base operations of the Security Police will be conducted per existing EAFB regulations.

In the event of a crash impact, other than a controlled impact at the planned site, Security Police will respond as directed by the On-Scene Commander. If the impact occurs off base, the On-Scene Commander is responsible for coordinating with civil authorities and will deploy Security Police to the scene as required. On the confines of EAFB. Security Police will afford full security protection of the Impact Site. Off the confines of EAFB, Security Police will assist NASA as requested and as consistent with agreements and regulations pertaining to civil law enforcement authorities. A cordon around the impact/crash will be established by the Security Forces under the direction of the On-Scene Commander a minimum of 2000 feet from crashed CID/720. Entry to the cordoned area will be authorized only by the On-Scene Commander, or the NASA on-scene representive (GOM/CC).

3.5 FIRE DEPARTMENT

Fire/Rescue personnel and firefighting apparatus will be prepositioned at designated locations on the base and with the convoy outside the flight termination envelope boundaries. Prior to CID/720 impact, the Chief, Fire Protection Branch, will respond to the On-Scene Commander and support him as required. Once this team is activated by the On-Scene Commander, a Senior Fire Officer directs this team in crew rescue and fire suppression as required in accordance with AFFTC and USAF procedures and the CID program requirements (Fire Department shall suppress all fires - NASA Safing Team shall pull all circuit breakers and disconnect or remove all batteries). All personnel on this team, including the Senior Fire Officer, will receive CID/720 Program peculiar fire, crash, and rescue training from FAA and ADFRF.

After fire suppression actions are complete, the Fire Chief will again respond to the On-Scene Commander, as required.

Major fire fighting capability will be provided by either standard USAF P-2 or P-4 vehicles. Capability includes water and foam. Normal crew is two or three firefighters. Three minute response time allows coverage up to about one mile radius in any direction, terrain permitting.

The Senior On-Scene Fire Officer shall report, to the On-Scene Commander, when the CID/720 and impact site is declared safe for entry by the AES, ISD, DRT, IET, and TFER teams. **(Entry of any personnel into the impact site after impact shall only be granted by the Ground Operations Manager/Convoy Commander)**

National Aeronautics and
Space Administration

Ames Research Center
Dryden Flight Research Facility
P O Box 273
Edwards, California 93523

NASA

Reply to Attn of: OD

28 November 1984

TO: CID Support Personnel

FROM: CID Ground Operations Manager

SUBJECT: CID Flight/Impact Day, Lakebed Vehicle and Personnel Assignments

CID/720 RWY 17 Takeoff Area

NASA 7 (NA 4288)	Misplay Kinn Sawyer Sahai Townsend
NASA 24 (NA 4244)	Anderson Mathieson
Avioncs (NA 4270)	Gonzales
Avioncs (NA 4283)	Webber Jameson
NASA 25 (NA 4188)	Cullum (Driver) Allen Barnicki Fuentes Saxer, Lt. Col. (@) Gregoire (JPL) Burke (JPL) Del Gandio (FAA)
GE (GE #74)(458 LAS)	Bonneau Mann Morgan Richard Selleck

NASA 53 (NA 4067)	CID Shuttle Bus Stone (Driver) Austin (LaRC) Bruce (LaRC) Dennis (LaRC) Juascage (LaRC) Lloyd (LaRC) May (LaRC) Taylor (LaRC) Horton ** McMurtry ** Mathieson * Sanders (Flame Gen)*(0300-0400) Seevers (Flame Gen)*(0300-0400)
AGE Vehicle (NA 4280)	Homiak (AGE) Dow (AGE)
JPL Vehicle (NA 7237)	Tibbitts (JPL) Dawson (JPL) Meilicke (JPL)
A/C Crew Vehicle (NA 4266) NASA 54	Bain Carlson Fedor Nice Lorek
A/C Crew Vehicle (NA 4265) NASA 10	Combs Pacewitz Biscayart
Hi Ranger (NA 4218)	
Stair Truck (NA 4238)	
TUG (B 52) (U625)	
Start Carts (2 each) ***	
Light-Alls (2 each) ***	
Aero Stand ***	
Fuel Bowser ***	

Vehicles and Personnel Going to RWY 25 for CID/720 Recovery

NASA 7 (NA 4288)	Misplay Kinn Sawyer Sahai Townsend
NASA 24 (NA 4244)	Anderson Combs Dennis (LaRC) Taylor (LaRC)
NASA 25 (NA 4188)	Cullum (Driver) Allen Barnicki Fuentes Saxer, Lt. Col. Gregoire (JPL) Burke (JPL) Del Gandio (FAA)
Tug (B 52) (U625)	(On Call by NASA 25)
Stair Truck (NA 4238)	(On Call by NASA 25)

Air Force Command Post

Air Force Security Command Post

Air Police Security Vehicles (4 ea Blue & Whites)

Fire Department - 9 Vehicles from South Base

Vehicles and Personnel at 17/22 Convoy Area

NASA 7 (NA 4288)	Misplay Kinn Sawyer Sahai Townsend
NASA 24 (NA 4244)	Anderson
Avioncs (NA 4270)	Gonzales
Avioncs (NA4283)	Webber Jameson
NASA 25 (NA 4188)	Cullum (Driver) Allen Barnicki Fuentes Saxer, Lt. Col. Gregoire (JPL) Burke (JPL) Del Gandio (FAA)
GE (GE #74)(458 LAS)	Bonneau Mann Morgan Richard Selleck
NASA 53 (NA 4067)	CID Shuttle Bus Stone (Driver) Austin (LaRC)** Bruce (LaRC) Dennis (LaRC) Juascage (LaRC)** Lloyd (LaRC) Taylor (LaRC) May (LaRC) Horton ** McMurtry **
AGE Vehicle (NA 4280)	Homiak (AGE) Dow (AGE)

JPL Vehicle (NA 7237)	Tibbitts (JPL) Dawson (JPL) Meilicke (JPL)
A/C Crew Vehicle (NA 4266) NASA 54	Bain Carlson Fedor Nice Lorek
A/C Crew Vehicle (NA 4265) NASA 10	Combs Pacewitz Biscayart
Hi Ranger (NA 4218)	
Stair Truck (NA 4238)	
TUG (B 52) (U625)	
Start Carts (2 each) ***	
Light-Alls (2 each) ***	
Aero Stand ***	
Fuel Bowser ***	
TM Van NASA 15 (NA 4133)	Rook Nakata
Breathing Equip. Support NASA 27 (NA 4189)	Cohn Gleason
B/O2 Support (NA 4281)	Shuck
Air Force Command Post	
Air Force Security Command Post	
Air Police Security Vehicles (4 ea Blue & Whites)	
JPL 7230	
JPL Photo/MAC-VAFB	
JPL Photo/MAC-VAFB	

JPL Photo/MAC-VAFB

JPL Photo/SAC-VAFB

JPL Photo/Tracker

JPL Photo/Generator Truck

Last Out Vehicle (NA 4247)	Edgeworth
NASA 22	Bailey
	Chambers

(NASA 22 will check in with NASA 25
and go to South Base/Fire Dept)

Personnel and Vehicles going to the CID Site after impact

NASA 7 (NA 4288)	Misplay Kinn Sawyer Sahai Townsend
NASA 24 (NA 4244)	Anderson May (LaRC) **** Bruce (LaRC) **** Dennis (LaRC) **** Lloyd (LaRC) **** Taylor (LaRC) ****
Avioncs (NA 4270)	Gonzales
NASA 25 (NA 4188)	Cullum (Driver) Allen Barnicki Fuentes Saxer, Lt. Col. Gregoire (JPL) Burke (JPL) Del Gandio (FAA)
JPL Vehicle (NA 7237)	Tibbitts (JPL) Dawson (JPL) Meilicke (JPL)
A/C Crew Vehicle (NA 4266) NASA 54	Bain Carlson Fedor Nice
Breathing Equip. Support NASA 27 (NA 4189)	Cohn Lorek
B/02 Support (NA 4281)	Shuck Gleason
Hi Ranger (NA 4218)	
Air Force Command Post	
Air Force Security Command Post	

Air Police Security Vehicles (4 ea Blue & Whites)

JPL 7230

JPL Photo/MAC-VAFB

JPL Photo/MAC-VAFB

JPL Photo/MAC-VAFB

JPL Photo/SAC-VAFB

JPL Photo/Tracker

JPL Photo/Generator Truck

Last Out Vehicle (NA 4247) NASA 22	Edgeworth Bailey Chambers

(NASA 22 will check in with NASA 25 and go to South Base/Fire Dept - Will return to Impact Site with Fire Dept. to shutdown elec. power (generator) for landing lights at Site to protect Fire Dept. personnel)

Personnel and Vehicles Returning to Dryden from Lakebed-RWY 17/22 Convoy Area

Avioncs (NA4283)	Webber Jameson
GE (GE #74)(458 LAS)	Bonneau Mann Morgan Richard Selleck
NASA 53 (NA 4067) # CID Shuttle Bus	Stone (Driver) # Horton ** McMurtry ** Juascage (LaRC)** Austin (LaRC)** Manense (JPL) **
AGE Vehicle (NA 4280)	Homiak (AGE) Dow (AGE)
A/C Crew Vehicle (NA 4265) NASA 10	Combs Pacewitz Biscayart
TM Van NASA 15 (NA 4133)	Rook Nakata
Stair Truck (NA 4238)	
TUG (52) (U625)	
Start Carts (2 each) ***	
Light-Alls (2 each) ***	
Aero Stand ***	
Fuel Bowser ***	

* Personnel or Vehicles **returning to Dryden Prior** to CID/720 **Takeoff**

** Personnel or Vehicles **returning to Dryden after** CID/720 **Impact**

*** Equipment being returned to Dryden after Impact by AGE Shop Personnel

**** Langley personnel shall transfer from NASA 53 to NASA 24 (May return to Dryden after Impact and return to Impact Site later - After safeing of the aircraft - 4 to 6 hrs after Impact)

\# NASA 53 shall return to Dryden than travel to the Impact Site as required via Mercury Blvd.

@ Lt. Col. Saxer will be transported to NASA 25 via the AF Command Post Vehicle @ 0600

Roger J. Barnicki
CID Ground Operations Manager

By Ordered Rows from GR OPS PER/FUNC/LOC

FUNCTION	NAME	LOCATION	CALL SIGN
AA 28 NOV 1984	AA 28 NOV	AA 28 NOV 1984	AA 28 NOV
AFFTC ON-SCENE COMMANDER`	SAXER, LT COL	NASA 25/17-22/CID SITE	EDDIE LEADER
AGE SUPPORT	DOW	NA 4280/RWY17-22	
AGE SUPPORT	HOMIAK	NA 4280/RWY17-22	
AIR FORCE COMMAND POST	BEEBY, SGT	RWY 17-22/25/CID SITE	EDWARDS COMMAND POS
AIR FORCE SECURITY COMMAND POST	EDMONDSON,SM SGT	RWY 17-22/25/CID SITE	EDWARDS SECURITY
AIRCRAFT AVIONCS CREW	JAMESON	NA 4283/17-22	GR OPS 09
AIRCRAFT AVIONCS CREW	SAWYER	NA 4288/17-22/CID SITE	GR OPS 05
AIRCRAFT AVIONCS CREW	WEBBER	NA 4283/17-22	GR OPS 11
AIRCRAFT AVIONCS CREW-SAFEING CREW	GONZALES	NA 4270/17-22/CID SITE	GR OPS 10
AIRCRAFT OPS-SAFEING CREW	BAIN	NA 4266/17-22/CID SITE	GR OPS 13
AIRCRAFT OPS-SAFEING CREW	CARLSON	NA 4266/17-22/CID SITE	GR OPS 14
AIRCRAFT OPS-SAFEING CREW	FEDOR	NA 4266/17-22/CID SITE	GR OPS 12
AIRCRAFT OPS-SAFEING CREW	KINN	NA 4288/17-22/CID SITE	GR OPS 06
AIRCRAFT OPS-SAFEING CREW	LOREK	NA 4266/17-22/CID SITE	GR OPS 08
AIRCRAFT OPS-SAFEING CREW	NICE	NA 4266/17-22/CID SITE	GR OPS 04
AIRCRAFT OPS-SAFEING CREW	SAHAI	NA 4288/17-22/CID SITE	GR OPS 07
AIRCRAFT OPS-SAFEING CREW	TOWNSEND	NA 4288/17-22/CID SITE	GR OPS 03/NASA 7
ASSIT. TO THE TV/PHOTO DIRECTOR	BURKE (JPL)	NASA 25/17-22/CID SITE	
BREATHING AIR SUPPORT(SCOTT PACKS)	COHN	NA 4189/RWY 17-22/CID SITE	NASA 27/GR OPS 27
BREATHING AIR SUPPORT(SCOTT PACKS)	GLEASON	NA 4189/RWY 17-22/CID SITE	
BREATHING AIR SUPPORT(SCOTT PACKS)	SHUCK	NA 4281/RWY 17-22/CID SITE	
CID SHUTTLE BUS	STONE	NA 4067/RWY17-22	NASA 53/ GR OPS 53
CID SITE - LAST OUT CHECK	BAILEY	NA 4247/SO BASE/CID SITE	NASA 22/GR OPS 22
CID SITE - LAST OUT CHECK	EDGWORTH	NA 4247/SO BASE/CID SITE	NASA 22/GR OPS 22
CID/720 AIRCRAFT ENGINEERING SUPPORT	MATHIESON	RWY 17-22/CONTROL ROOM	
CID/720 CREW CHIEF	MISPLAY	NA 4288/17-22/CID SITE	GR OPS 02/NASA 7
CID/720 FLT ENGINEER(COCKPIT SETUP)	HORTON	NA 4067/RWY17-22	NASA 833
CID/720 NASA AIRCRAFT INSPECTION	BISCAYART	NA 4265/RWY 17-22	INSPECTION 02
CID/720 NASA AIRCRAFT INSPECTION	PACEWITZ	NA 4265/RWY 17-22	INSPECTION 01
CID/720 NASA AIRCRAFT SUPERVISOR	COMBS	NA 4265/RWY 17-22	NASA 10
CID/720 PILOT (COCKPIT SETUP)	MC MURTRY	NA 4067/RWY17-22	NASA 833
DAS PRE-FLIGHT (LANGLEY)	AUSTIN	NA 4067/RWY17-22	LANGLEY 06
DAS PRE-FLIGHT (LANGLEY)	BRUCE	NA 4067/RWY17-22	LANGLEY 04

Ordered Rows from GR OPS PER/FUNC/LOC

FUNCTION	NAME	LOCATION	CALL SIGN
DAS PRE-FLIGHT (LANGLEY)	DENNIS	NA 4067/RWY17-22	LANGLEY 01
DAS PRE-FLIGHT (LANGLEY)	JUASCAGE	NA 4067/RWY17-22	LANGLEY 07
DAS PRE-FLIGHT (LANGLEY)	LLOYD	NA 4067/RWY17-22	LANGLEY 05
DAS PRE-FLIGHT (LANGLEY)	MAY	NA 4067/RWY17-22	LANGLEY 03
DAS PRE-FLIGHT (LANGLEY)	TAYLOR	NA 4067/RWY17-22	LANGLEY 02
DEPUTY GROUND OPERATIONS MANAGER	ALLEN	NASA 25/17-22/CID SITE	GR OPS 01
DRYDEN COMM (NASA 1)	QUINTRON	NASA 1 - BLDG 4800	DRYDEN COMM
EDWARDS JPL PHOTO/AC SYSTEMS	TIBBITTS	NA 7237/RWY 17-22/CID SITE	PHOTO 05
FIRE CHIEF AT EAFB	BELL, CHIEF	SO. BASE/RWY 25/CID SITE	EDWARDS CHIEF
FLAME GENERATOR SERVICEING/ARMING	SANDERS	NA 4067/RWY17-22	
FLAME GENERATOR SERVICEING/ARMING	SEEVERS	NA 4067/RWY17-22	
GE ENGINE/DEGRADER SUPPORT	BONNEAU	GE#74-458 LAS/RWY 17-22	GE 02
GE ENGINE/DEGRADER SUPPORT	MANN	GE#74-458 LAS/RWY 17-22	GE 03
GE ENGINE/DEGRADER SUPPORT	MORGAN	GE#74-458 LAS/RWY 17-22	GE 01
GE ENGINE/DEGRADER SUPPORT	RICHARD	GE#74-458 LAS/RWY 17-22	GE 04
GE ENGINE/DEGRADER SUPPORT	SELLECK	GE#74-458 LAS/RWY 17-22	GE 05
GROUND OPERATIONS MANAGER	BARNICKI	NASA 25/17-22/CID SITE	NASA 25/NASA GOM
JPL PHOTO SUPPORT	BRIDGES	RWY 17-22/CID SITE	PHOTO 10
JPL PHOTO SUPPORT	DAWSON	RWY 17-22/CID SITE	PHOTO 04
JPL PHOTO SUPPORT	FRANZ	RWY 17-22/CID SITE	PHOTO 08
JPL PHOTO SUPPORT	HORNADAY	C-7 SITE EAST SHORE	PHOTO 12
JPL PHOTO SUPPORT	MEILICKE	RWY 17-22/CID SITE	PHOTO 09
JPL PHOTO SUPPORT	NAGGY	C-7 SITE EAST SHORE	PHOTO 11
JPL PHOTO SUPPORT	SHIPMAN	C-7 SITE EAST SHORE	PHOTO 02
JPL PHOTO SUPPORT	SZCZUROSKI	RWY 17-22/CID SITE	PHOTO 07
JPL PHOTO SUPPORT	TRIMM	RWY 17-22/CID SITE	PHOTO 06
JPL PHOTO SUPPORT	WYNNE	RWY 17-22/CID SITE	PHOTO 03
JPL PHOTO SUPPORT (HARD LINE)	BIXLER	RWY 17-22/CID SITE	
JPL PHOTO SUPPORT (HARD LINE)	HANSON	RWY 17-22/CID SITE	
LANDING LIGHTS OPERATOR (CID SITE)	CHAMBERS	NA 4247/SO BASE/CID SITE	NASA 22/GR OPS 22
LEADER, A/C SAFEING CREW	DEL GANDIO	NASA 25/17-22/CID SITE	SAFE LEADER
NASA 25 DRIVER	CULLUM	NASA 25/17-22/CID SITE	DRIVER 25
NASA TM VAN	ROOK/NAKATA	17/22	NASA 15/GR OPS 15
NASA TV CAMERA	QUINTRON	C-7 SITE/EAST SHORE	NASA 28

Ordered Rows from GR OPS PER/FUNC/LOC

FUNCTION	NAME	LOCATION	CALL SIGN
OPERATIONS ENGINEERING	ANDERSON	NA 4244/17-22/CID SITE	NASA 24/GR OPS 24
OUALITY ASSURANCE	FUENTES	NASA 25/17-22/CID SITE	QUALITY
TV/PHOTO DOCUMENTATION DIRECTOR	GREGOIRE (JPL)	NASA 25/17-22/CID SITE	PHOTO 01

Ordered Rows BY NAME from GR OPS PER/FUNC/LOC

FUNCTION	NAME	LOCATION	CALL SIGN
AA 28 NOV 1984	AA 28 NOV	AA 28 NOV 1984	AA 28 NOV
DEPUTY GROUND OPERATIONS MANAGER	ALLEN	NASA 25/17-22/CID SITE	GR OPS 01
OPERATIONS ENGINEERING	ANDERSON	NA 4244/17-22/CID SITE	NASA 24/GR OPS 24
DAS PRE-FLIGHT (LANGLEY)	AUSTIN	NA 4067/RWY17-22	LANGLEY 06
CID SITE - LAST OUT CHECK	BAILEY	NA 4247/SO BASE/CID SITE	NASA 22/GR OPS 22
AIRCRAFT OPS-SAFEING CREW	BAIN	NA 4266/17-22/CID SITE	GR OPS 13
GROUND OPERATIONS MANAGER	BARNICKI	NASA 25/17-22/CID SITE	NASA 25/NASA GOM
AIR FORCE COMMAND POST	BEEBY, SGT	RWY 17-22/25/CID SITE	EDWARDS COMMAND POS
FIRE CHIEF AT EAFB	BELL, CHIEF	SO. BASE/RWY 25/CID SITE	EDWARDS CHIEF
CID/720 NASA AIRCRAFT INSPECTION	BISCAYART	NA 4265/RWY 17-22	INSPECTION 02
JPL PHOTO SUPPORT (HARD LINE)	BIXLER	RWY 17-22/CID SITE	
GE ENGINE/DEGRADER SUPPORT	BONNEAU	GE#74-458 LAS/RWY 17-22	GE 02
JPL PHOTO SUPPORT	BRIDGES	RWY 17-22/CID SITE	PHOTO 10
DAS PRE-FLIGHT (LANGLEY)	BRUCE	NA 4067/RWY17-22	LANGLEY 04
ASSIT. TO THE TV/PHOTO DIRECTOR	BURKE (JPL)	NASA 25/17-22/CID SITE	
AIRCRAFT OPS-SAFEING CREW	CARLSON	NA 4266/17-22/CID SITE	GR OPS 14
LANDING LIGHTS OPERATOR (CID SITE)	CHAMBERS	NA 4247/SO BASE/CID SITE	NASA 22/GR OPS 22
BREATHING AIR SUPPORT(SCOTT PACKS)	COHN	NA 4189/RWY 17-22/CID SITE	NASA 27/GR OPS 27
CID/720 NASA AIRCRAFT SUPERVISOR	COMBS	NA 4265/RWY 17-22	NASA 10
NASA 25 DRIVER	CULLUM	NASA 25/17-22/CID SITE	DRIVER 25
JPL PHOTO SUPPORT	DAWSON	RWY 17-22/CID SITE	PHOTO 04
LEADER, A/C SAFEING CREW	DEL GANDIO	NASA 25/17-22/CID SITE	SAFE LEADER
DAS PRE-FLIGHT (LANGLEY)	DENNIS	NA 4067/RWY17-22	LANGLEY 01
AGE SUPPORT	DOW	NA 4280/RWY17-22	
CID SITE - LAST OUT CHECK	EDGWORTH	NA 4247/SO BASE/CID SITE	NASA 22/GR OPS 22
AIR FORCE SECURITY COMMAND POST	EDMONDSON, SM SGT	RWY 17-22/25/CID SITE	EDWARDS SECURITY
AIRCRAFT OPS-SAFEING CREW	FEDOR	NA 4266/17-22/CID SITE	GR OPS 12
JPL PHOTO SUPPORT	FRANZ	RWY 17-22/CID SITE	PHOTO 08
QUALITY ASSURANCE	FUENTES	NASA 25/17-22/CID SITE	QUALITY
BREATHING AIR SUPPORT(SCOTT PACKS)	GLEASON	NA 4189/RWY 17-22/CID SITE	
AIRCRAFT AVIONCS CREW-SAFEING CREW	GONZALES	NA 4270/17-22/CID SITE	GR OPS 10
TV/PHOTO DOCUMENTATION DIRECTOR	GREGOIRE (JPL)	NASA 25/17-22/CID SITE	PHOTO 01
JPL PHOTO SUPPORT (HARD LINE)	HANSON	RWY 17-22/CID SITE	
AGE SUPPORT	HOMIAK	NA 4280/RWY17-22	

Ordered Rows from GR OPS PER/FUNC/LOC

FUNCTION	NAME	LOCATION	CALL SIGN
JPL PHOTO SUPPORT	HORNADAY	C-7 SITE EAST SHORE	PHOTO 12
CID/720 FLT ENGINEER(COCKPIT SETUP)	HORTON	NA 4067/RWY17-22	NASA 833
AIRCRAFT AVIONCS CREW	JAMESON	NA 4283/17-22	GR OPS 09
DAS PRE-FLIGHT (LANGLEY)	JUASCAGE	NA 4067/RWY17-22	LANGLEY 07
AIRCRAFT OPS-SAFEING CREW	KINN	NA 4288/17-22/CID SITE	GR OPS 06
DAS PRE-FLIGHT (LANGLEY)	LLOYD	NA 4067/RWY17-22	LANGLEY 05
AIRCRAFT OPS-SAFEING CREW	LOREK	NA 4266/17-22/CID SITE	GR OPS 08
GE ENGINE/DEGRADER SUPPORT	MANN	GE#74-458 LAS/RWY 17-22	GE 03
CID/720 AIRCRAFT ENGINEERING SUPPORT	MATHIESON	RWY 17-22/CONTROL ROOM	
DAS PRE-FLIGHT (LANGLEY)	MAY	NA 4067/RWY17-22	LANGLEY 03
CID/720 PILOT (COCKPIT SETUP)	MC MURTRY	NA 4067/RWY17-22	NASA 833
JPL PHOTO SUPPORT	MEILICKE	RWY 17-22/CID SITE	PHOTO 09
CID/720 CREW CHIEF	MISPLAY	NA 4288/17-22/CID SITE	GR OPS 02/NASA 7
GE ENGINE/DEGRADER SUPPORT	MORGAN	GE#74-458 LAS/RWY 17-22	GE 01
JPL PHOTO SUPPORT	NAGGY	C-7 SITE EAST SHORE	PHOTO 11
AIRCRAFT OPS-SAFEING CREW	NICE	NA 4266/17-22/CID SITE	GR OPS 04
CID/720 NASA AIRCRAFT INSPECTION	PACEWITZ	NA 4265/RWY 17-22	INSPECTION 01
DRYDEN COMM (NASA 1)	QUINTRON	NASA 1 - BLDG 4800	DRYDEN COMM
NASA TV CAMERA	QUINTRON	C-7 SITE/EAST SHORE	NASA 28
GE ENGINE/DEGRADER SUPPORT	RICHARD	GE#74-458 LAS/RWY 17-22	GE 04
NASA TM VAN	ROOK/NAKATA	17/22	NASA 15/GR OPS 15
AIRCRAFT OPS-SAFEING CREW	SAHAI	NA 4288/17-22/CID SITE	GR OPS 07
FLAME GENERATOR SERVICEING/ARMING	SANDERS	NA 4067/RWY17-22	
AIRCRAFT AVIONCS CREW	SAWYER	NA 4288/17-22/CID SITE	GR OPS 05
AFFTC ON-SCENE COMMANDER`	SAXER, LT COL	NASA 25/17-22/CID SITE	EDDIE LEADER
FLAME GENERATOR SERVICEING/ARMING	SEEVERS	NA 4067/RWY17-22	
GE ENGINE/DEGRADER SUPPORT	SELLECK	GE#74-458 LAS/RWY 17-22	GE 05
JPL PHOTO SUPPORT	SHIPMAN	C-7 SITE EAST SHORE	PHOTO 02
BREATHING AIR SUPPORT(SCOTT PACKS)	SHUCK	NA 4281/RWY 17-22/CID SITE	
CID SHUTTLE BUS	STONE	NA 4067/RWY17-22	NASA 53/ GR OPS 53
JPL PHOTO SUPPORT	SZCZUROSKI	RWY 17-22/CID SITE	PHOTO 07
DAS PRE-FLIGHT (LANGLEY)	TAYLOR	NA 4067/RWY17-22	LANGLEY 02
EDWARDS JPL PHOTO/AC SYSTEMS	TIBBITTS	NA 7237/RWY 17-22/CID SITE	PHOTO 05
AIRCRAFT OPS-SAFEING CREW	TOWNSEND	NA 4288/17-22/CID SITE	GR OPS 03/NASA 7

Ordered Rows from GR OPS PER/FUNC/LOC

FUNCTION	NAME	LOCATION	CALL SIGN
JPL PHOTO SUPPORT	TRIMM	RWY 17-22/CID SITE	PHOTO 06
AIRCRAFT AVIONCS CREW	WEBBER	NA 4283/17-22	GR OPS 11
JPL PHOTO SUPPORT	WYNNE	RWY 17-22/CID SITE	PHOTO 03

Convoy Operations/Readiness Checklist 20 NOV. 84

GROUND OPERATIONS FLT. No.__________ Date ___________

1 ____ RADIO CALL TO NASA 1 - NASA 25 on station and ready to support

2 ____ Ground Operations Personnel roll call and radio check (count)

3 ____ All Communications Operational - UHF/VHF/CH2/CH3/CH1/Fire Net

4 ____ All Pre-Takeoff aircraft support equipment identified, checked, and in place at takeoff point

5 ____ All personnel participating in impact day activity issued Yellow Fire Protective Coveralls, and Lakebed Access Badges

6 ____ Edwards Ground Control has closed lakebed to all others

7 ____ Operational Control Area and Lakebed access controls in place

8 ____ Glide Slope TV camera on and aimed - Personnel clear of site (TV2/TV3) (0600)

9 ____ Impact Site cleared of all non-mission personnel

10____ Impact Site Landing Lights on

11____ "C" Band Becon check complete

12____ NASA Security personnel (Charlie 37) relocated to Santa Fe Trail

13____ Air Force and NASA Security in place and ready to support mission

14____ Impact Site Mission Ready

15____ Brerathing Air Equipment and Support Personnel ready and in convoy

16____ All CID 720 Safeing personnel identified, assigned and in convoy

17____ AFFTC Fire Department briefed and in position to support mission

18____ All Convoy Ground Operations personnel identified

19____ All Convoy and Lakebed vehicles identified and placarded (count)

20____ NASA Security personnel (Charlie 36) evacuated to convoy area - road block set-up at impact site road and Mercury Blvd.

21____ Runways 17 and 25 Checked and Operational (Edgeworth)

22____ Air Force Secirity has Secured outer boundries of CID control area

Convoy Operations/Readiness Checklist 20 NOV. 84

GROUND OPERATIONS FLT. No.__________ Date ___________ pg 2

23____ JPL Photo ready to support mission

24____ ALL Personnel Clear of Impact Site for mission

25____ All Equipment clear of Aircraft

26____ ALL Personnel OFF CID 720 and clear of aircraft - ready for brake release

27____ RADIO CALL TO NASA 1 - Impact Site clear ---- CID 720 and all ground operations ready for brake release and take off

AIRCRAFT/EXPERIMENT SAFING TEAM

TEAM #1 - JOE MISPLAY
JOE KINN

TEAM #2 - FRANK FEDOR
JOE SAHAI

TEAM #3 - FRANK DEL GANDIO

RELIEF TEAM - DARYL TOWNSEND
GARY CARLSON
DAN BAIN
ROBERT GONZALES
ED NICE
ROBERT ALLEN

ASSESSMENT TEAM

FIRST IN - FRANK DEL GANDIO
JOE MISPLAY
FRANK FEDOR

RADIO CALL PROCEDURES

1. Monitor radio frequency to be used. (Do NOT key radio or talk interrupting other users -- wait your turn!)

2. State who you are calling. (Edw. Gnd.) (Edw. Twr) (NASA -1), etc.

3. Identify yourself and make your location known. (This is NASA -5 at NASA Lake Bed Ramp)...(This is NASA -12, East end Runway 22), etc.

4. Make your request. (Request lake bed clearance to MSBLS site). Request clearance to cross runway), etc.

5. To change position on lake bed, or return to NASA Lake bed taxie ramp, a request and clearance from Edw. Gnd. must be obtained.

6. When crossing runway or returning from lake bed, always call Edw. Gnd. and inform them when you are clear of runway or lake bed. (Edw. Gnd., NASA -5 Clear lake bed), etc.

7. At all times monitor radio for emergency messages that may tell you to vacate your present position.

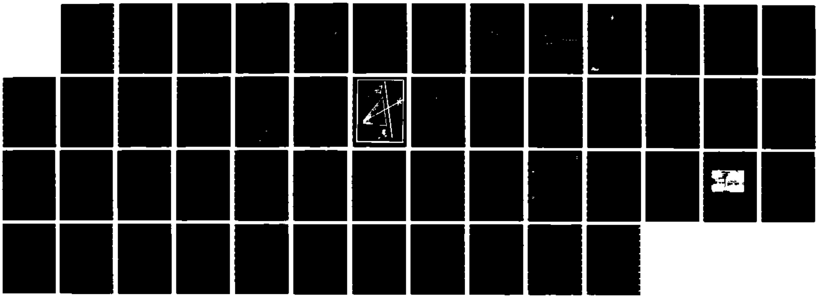
RADIO CALL SIGNS 20 NOV. 1984

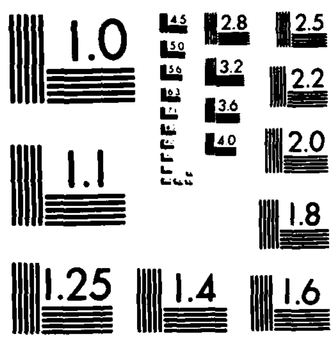
NASA GOM	BARNICKI - WHEN OUT OF NASA 25 (HANDHELD-DES)
NASA SECURITY 01	POST 1 AT DRYDEN (HANDHELD)
NASA 01	DRYDEN FLIGHT CONTROL CENTER
NASA 04	PILOTS OFFICE - FLIGHT OPERATIONS
NASA 07	CID CREW CHIEF - UHF RADIO
NASA 10	A/C SUPPORT - UHF RADIO
NASA 15	NASA TM VAN - ROOK-NAKATA - UHF RADIO
NASA 16	NASA TM VAN - SABO-CONE
NASA 22	EDGEWORTH - UHF RADIO
NASA 24	ANDERSON - UHF RADIO
NASA 25	CID COMMAND POST (FLT OPS COMM VAN)
NASA 27	COHN - UHF RADIO
NASA 28	NASA TV VAN QUINTRON - UHF RADIO OR HANDHELD
NASA 53	CID SHUTTLE BUS - UHF RADIO
GR OPS BASE	AIRCRAFT MAINTTENANCE OFFICE - C. HALEY
GR OPS 01	ALLEN (DEP GOM)
GR OPS 02	MISPLAY (720 GR CREW CHIEF)
GR OPS 03	TOWNSEND
GR OPS 04	NICE
GR OPS 05	SAWYER
GR OPS 06	KINN
GR OPS 07	SAHAI
GR OPS 08	LOREK
GR OPS 09	JAMESON
GR OPS 10	GONZALES

GR OPS 11	WEBBER
GR OPS 12	FEDOR
GR OPS 13	BAIN
GR OPS 14	CARLSON
GR OPS 15	NASA TM VAN - ROOK-NAKATA (HANDHELD RADIO)
GR OPS 22	EDGEWORTH (HANDHELD RADIO)
GR OPS 24	ANDERSON - OPS ENGINEERING (HANDHELD RADIO)
GR OPS 27	COHN - SCOTT PACKS/BREATHING AIR (HANDHELD)
PHOTO 01	TV/PHOTO DOC. DIRECTOR (GREGOIRE)
PHOTO 02	SHIPMAN (ON LAKEBED)
PHOTO 03	WYNNE (ON LAKEBED)
PHOTO 04	DAWSON (ON LAKEBED)
PHOTO 05	TIBBITS (ON LAKEBED)
PHOTO 06	TRIMM (ON LAKEBED)
PHOTO 07	SZCZUROSKI (ON LAKEBED)
PHOTO 08	FRANZ (ON LAKEBED)
PHOTO 09	MC BANE (ON LAKEBED)
PHOTO 10	BRIDGES (ON LAKEBED)
PHOTO 11	NAGGY
PHOTO 12	HORNADAY
CHARLIE 36	CID SITE SECURITY POST
CHARLIE 37	CID SITE SECURITY
CHARLIE 38	CID/720 SECURITY
CHARLIE 39	PHOTO EQUIP/MEDIA SITE SECURITY
CHIPPY	FACILITIES/SER-AIR SUPPORT COORDINATOR
DRIVER 25	CULLUM
DRYDEN COMM	QUINTRON (NASA 1)

AD-A171 719 FULL-SCALE TRANSPORT CONTROLLED IMPACT DEMONSTRATION PROGRAM PHOTOGRAPHIC..(U) JET PROPULSION LAB PASADENA CA J D GREGOIRE APR 86 JPL-D-2534 DOT/FAA/CT-85/35 5/5

UNCLASSIFIED DTFA03-80-A-00215 F/G 14/5 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

EDDIE LEADER	LT COL SAXER
EDWARDS CHIEF (1 & 2)	AFFTC FIRE CHIEF
EDWARDS SECURITY	EDMONSON (AIR POLICE)
GE 01	MORGAN - GENERAL ELECTRIC ENG
LANGLEY 01	DAS TEAM
LIFE SUPPORT	LIFE SUPPORT SHOP (CH 2 ONLY)(DES)
PAO BASE	PUBLIC AFFAIRS OFFICE - JACKSON
PAO 01	LOVATO (MEDIA)
PAO 02	REINERTSON (MEDIA)
QUALITY	FUENTES
SAFE LEADER	DEL GANDIO (FAA SAFEING TEAM LEADER)
SERV-AIR 01	SERV-AIR SUPPORT SUPERVISOR
SERV-AIR 02	SERV-AIR CREW LEADER
SITE MANAGER	KNUTSON (HANDHELD-DES)
TV 01	SIDDLE (ON LAKEBED)
TV 02	YEE (ON LAKEBED)
TV 03	WHEATON(DRYDEN)

1984 OCT 16 AM 10 02

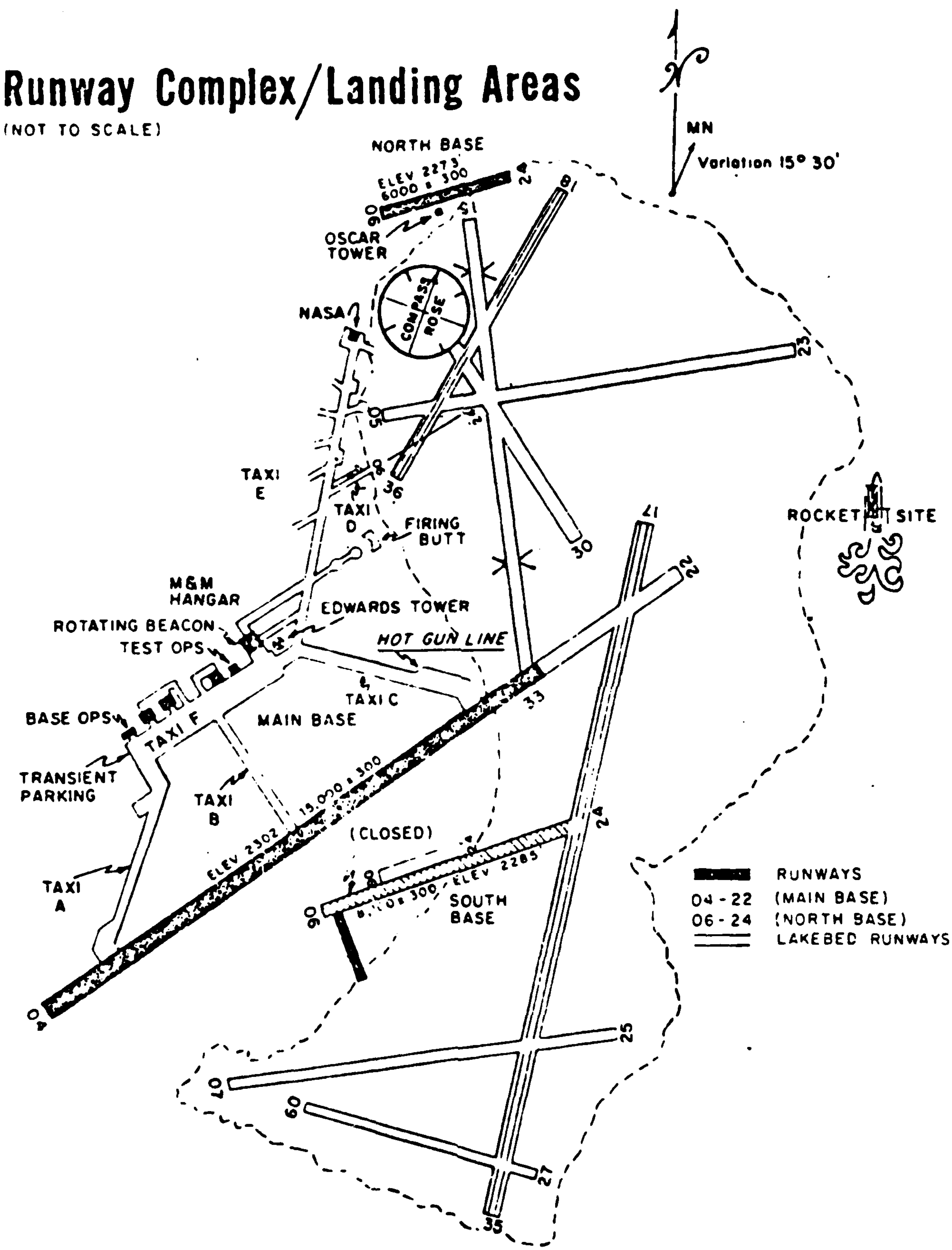
NASA DRYDEN RADIO CALL SIGNS (Updated OCTOBER 16,1984)

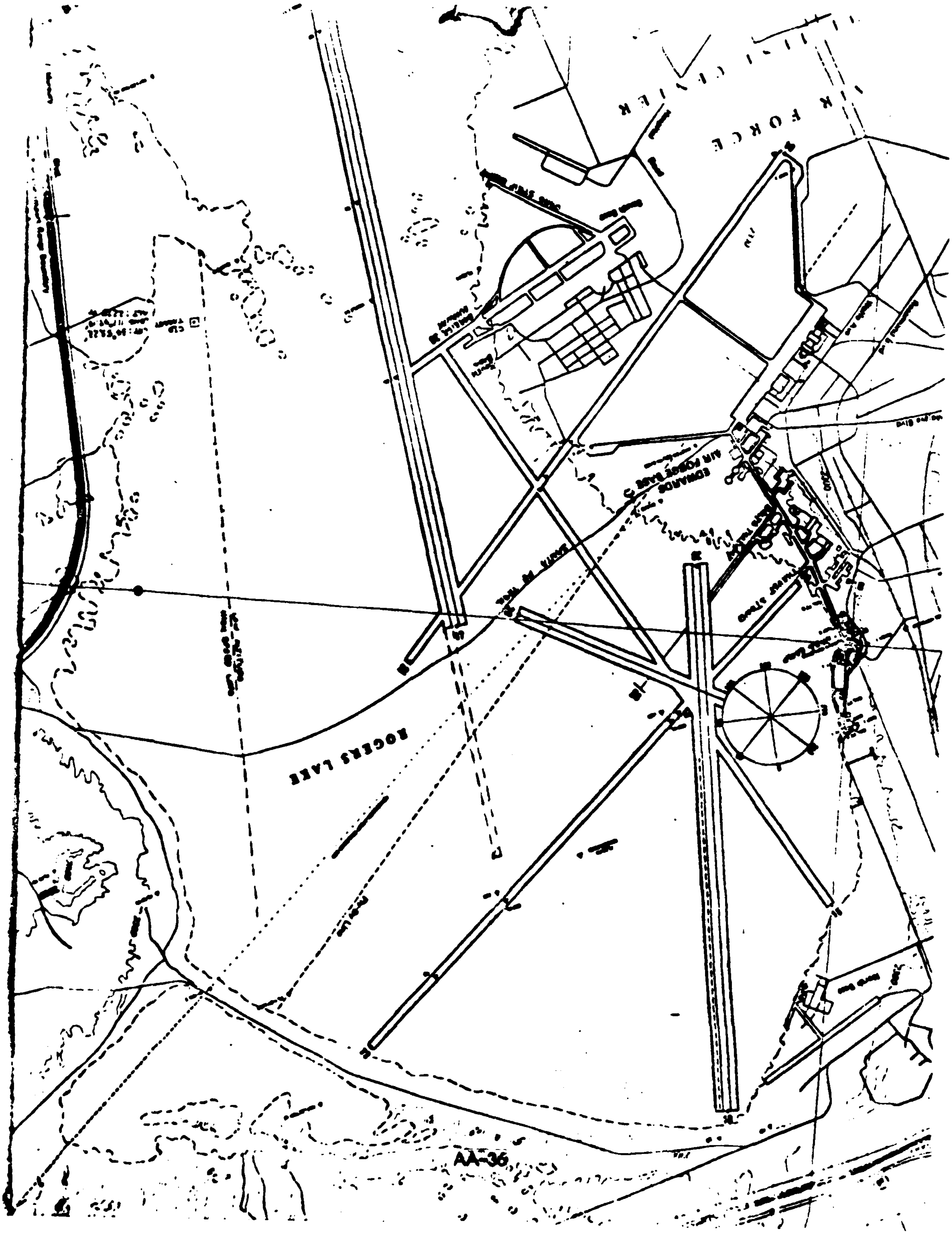
CALL SIGN	IDENTITY	LOCATION
NASA 1	BLUE ROOM, RM 3018	DRYDEN CONTROL CENTER-BLDG 4800
NASA 2	GOLD ROOM, RM 3016	DRYDEN CONTROL CENTER-BLDG 4800
NASA 3	COMMUNICATIONS FACILITY	DRYDEN BLDG 4824
NASA 4	PILOTS FLIGHT OPS RM 2064	DRYDEN BLDG 4800
NASA 5	RADIO SHOP-VEHICLE	VEHICLE LICENSE: NA 4246
NASA 6	AIRCRAFT COMM LAB	COMM/NAV LAB - BLDG 4800
NASA 7	ALERT PICK-UP	VEHICLE LICENSE: NA 4178
NASA 8	GENERAL OPERATIONS	RPRV FACILITY - BLDG 4800
NASA 9	FLT OPS CONTROL VAN	VEHICLE LICENSE: NA 4166
NASA 10	AVIONICS PICK-UP	VEHICLE LICENSE: NA 4265
NASA 11	FLT MAINTENANCE VEHICLE	VEHICLE LICENSE: NA 4150
NASA 12	DALE REED PICK-UP	VEHICLE LICENSE: NA 4184
NASA 13	PILOTS VEHICLE	VEHICLE LICENSE:
NASA 14	NOISE MEASUREMENT VAN	VEHICLE LICENSE: NA 4078
NASA 15	TELEMETRY VAN (CONDOR)	VEHICLE LICENSE: NA 4133
NASA 16	TELEMETRY VAN (CONDOR)	VEHICLE LICENSE: NA 4092
NASA 17	PILOT EQUIP. VAN (BARNIKI)	VEHICLE LICENSE: NA 4081,
NASA 18	TELEMETRY VAN (LOAN AMES)	VEHICLE LICENSE: NA 4048
NASA 19	AIR G/P VEHICLE	VEHICLE LICENSE: NA 4052
NASA 20	FPS-16/TRIPLEX	DRYDEN RADAR BLDG 4982
NASA 21	RPRV LAB, PILOT POSITION	RPRV LAB - BLDG 4800
NASA 22	AVIONICS VAN	VEHICLE LICENSE: NA 4247
NASA 23	SPECTRUM ANALYSIS FACILITY	DRYDEN TELEMETRY - BLDG 4800
NASA 24	PILOTS VEHICLE	FLT-OPS, VEHICLE LICENSE: NA 4244
NASA 25	FLT OPS COMM VAN (SHUTTLE)	VEHICLE LICENSE: NA 4188
NASA 26	RCA (CAR OPERATTIONS)	VEHICLE LICENSE: 1BEY192
NASA 27	DRYDEN ACOUSTICS VAN	VEHICLE LICENSE: NA 4189
NASA 28	DRYDEN VIDEO VAN	VEHICLE LICENSE: NA 4259
NASA 29	DRYDEN VIDEO VAN	VEHICLE LICENSE: RESERVED
NASA 30	RCA LEASE VEHICLE	VEHICLE LICENSE: 1BEX928
NASA 31	RCA INSTRUMENTATION VAN	VEHICLE LICENSE: 4090 (STS area)
NASA 32	DRYDEN EXTERNAL AFFAIRS	PAO TRLR
NASA 33	DRYDEN PROTOCOL OPERATIONS	PAO TRLR
NASA 34	RCA LEASE VEHICLE	VEHICLE LICENSE: 1X57396
NASA 35	RCA LEASE VEHICLE	VEHICLE LICENSE: 1D13291
NASA 36	RCA	VEHICLE LICENSE: NA 4159
NASA 37	RCA (Used for PAPI) green	VEHICLE LICENSE: 1D13293
NASA 38	RCA (Used for PAPI) white	VEHICLE LICENSE: NA 4237
NASA 39	RCA (Used for PAPI) white	VEHICLE LICENSE: NA 4124
NASA 40	RCA LAKE BED VHF (KA-94)	VEHICLE LICENSE: NA 4292 KA-94
NASA 41	SMITH LAKE BED VHF (KA-94)	VEHICLE LICENSE: NA 4287 KA-94
NASA 42		
NASA 43		

NASA 44		
NASA 45		
NASA 46		
NASA 47		
NASA 48		
NASA 49		
NASA 50	ARC-159 UHF PORTABLE	RADIO SHOP, BLDG 4800/1082
NASA 51	UHF PORTABLE	RADIO SHOP
NASA 52	UHF PORTABLE	RADIO SHOP
NASA 53	UHF PORTABLE	RADIO SHOP
NASA 54	UHF PORTABLE	RADIO SHOP
NASA 55	VHF PORTABLE	RADIO SHOP
NASA 56	VHF PORTABLE	RADIO SHOP
NASA 57	KY-82, PORTABLE VHF	RADIO SHOP, BLDG 4800/1082
NASA 58	KY-82, PORTABLE VHF	RADIO SHOP, BLDG 4800/1083
NASA 59	KY-82, PORTABLE VHF	RADIO SHOP, BLDG 4800/1083
NASA 60	VHF PORTABLE	PHOTO LAB, BLDG 4800/1043
NASA 61	SPARE VHF PORTABLE	RADIO SHOP, BLDG 4800/1082
NASA 62	VHF FM TAC-TEC	RADIO SHOP
NASA 63	VHF FM TAC-TEC	RADIO SHOP
NASA 64	VHF FM TAC-TEC	RADIO SHOP
NASA 65	VHF FM TAC-TEC	RADIO SHOP
NASA 66	VHF FM TAC-TEC	RADIO SHOP
NASA 67	VHF-FM, MX-350	RADIO SHOP, BLDG 4800/1082
NASA 68	VHF-FM, MX-350	RADIO SHOP, BLDG 4800/1082
NASA 69	VHF-FM, MX-350	RADIO SHOP, BLDG 4800/1082
NASA 70	VHF-FM, MX-350	RADIO SHOP, BLDG 4800/1082
NASA 71		
NASA 72		
NASA 73		
NASA 74		
NASA 75		
NASA 76	STS SUPPORT VHF-FM	SHUTTLE - AREA 'A' TLR 64
NASA 77		
NASA 78		
NASA 79		
NASA 80		
NASA 81		
NASA 82		
NASA 83		
NASA 84		
NASA 85		
NASA 86		
NASA 87		
NASA 88		
NASA 89		
NASA 90		
NASA 91		
NASA 92		
NASA 93	STS support VHF-FM	SHUTTLE AREA 'A' TLR 64

Runway Complex/Landing Areas

(NOT TO SCALE)




ROGERS LAKE
EDWARDS AIR FORCE BASE

HOW TO GET TO CID CRASH SITE

Leave the back of NASA and proceed down the taxiway road to the tower. Dial up EDDIE GROUND on your radio by selecting either preset #3 or 390.1 or 121.8 .
At the tower, cross the taxiway on the designated roadway, being sure you make the stop and look BOTH WAYS for aircraft. Proceed out the east taxiway for about 100 yards until you come to a blacktop road which cuts off to your left. Turn onto this road and then take the first gravel road to your right off this blacktop. This is only about 100 feet down the blacktop. THIS IS THE SANTA FE TRAIL. Follow it until you come to the lakebed and STOP.

Now comes the fun part.

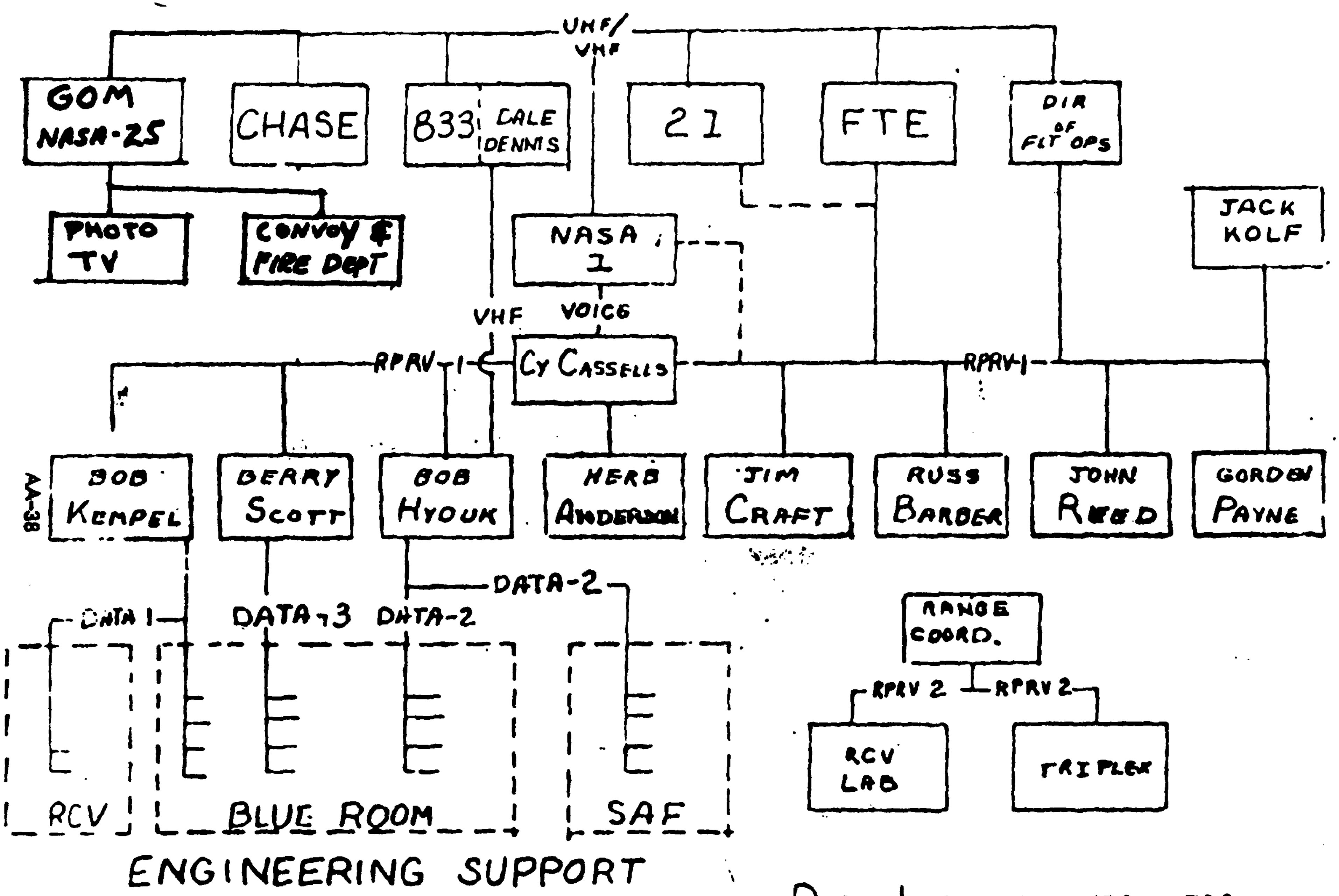
Pick up your trusty mic and have a conversation with EDDIE GROUND which will go something like this:

NASA XX: EDDIE GROUND, this is NASA XX MOBILE.
EDDIE G: NASA XX MOBILE; EDDIE GROUND. Go ahead.
NASA XX: Request permission to proceed from the west shore of the lake bed to east shore via the Santa Fe trail and the Low Altitude High Speed coarse

At this point, EDDIE GROUND will do one of two things. He will give you clearance as requested with some sort of directions to call him when you have reached your destination. Proceed ahead, keeping watch for aircraft, especilly around the numbers on 30 (check your map) and around the extention to 17 Left. OR-- He will give your permission to proceed but to obtain clearance before crossing any lakebed runways. This means that you will have to stop before crossing Lakebed 15/33,the approach end of 30, and the extention to 17 Left (check your map again) and go through the same thing as above, except this time ask for permission to cross each LAKEBED runway as you come to it.

When you are through at the crash site, you have to go through the whole thing again, retracing your steps along the LAHS coarse and then along the SANTA FE trail. Call EDDIE GROUND before you start back and once again when clear of the lakebed.

GOD SPEED!



AA-38

DATA 1 WILL BE USED FOR INTERNAL COORDINATION

CID Impact Flight Profile and Operational Control Area

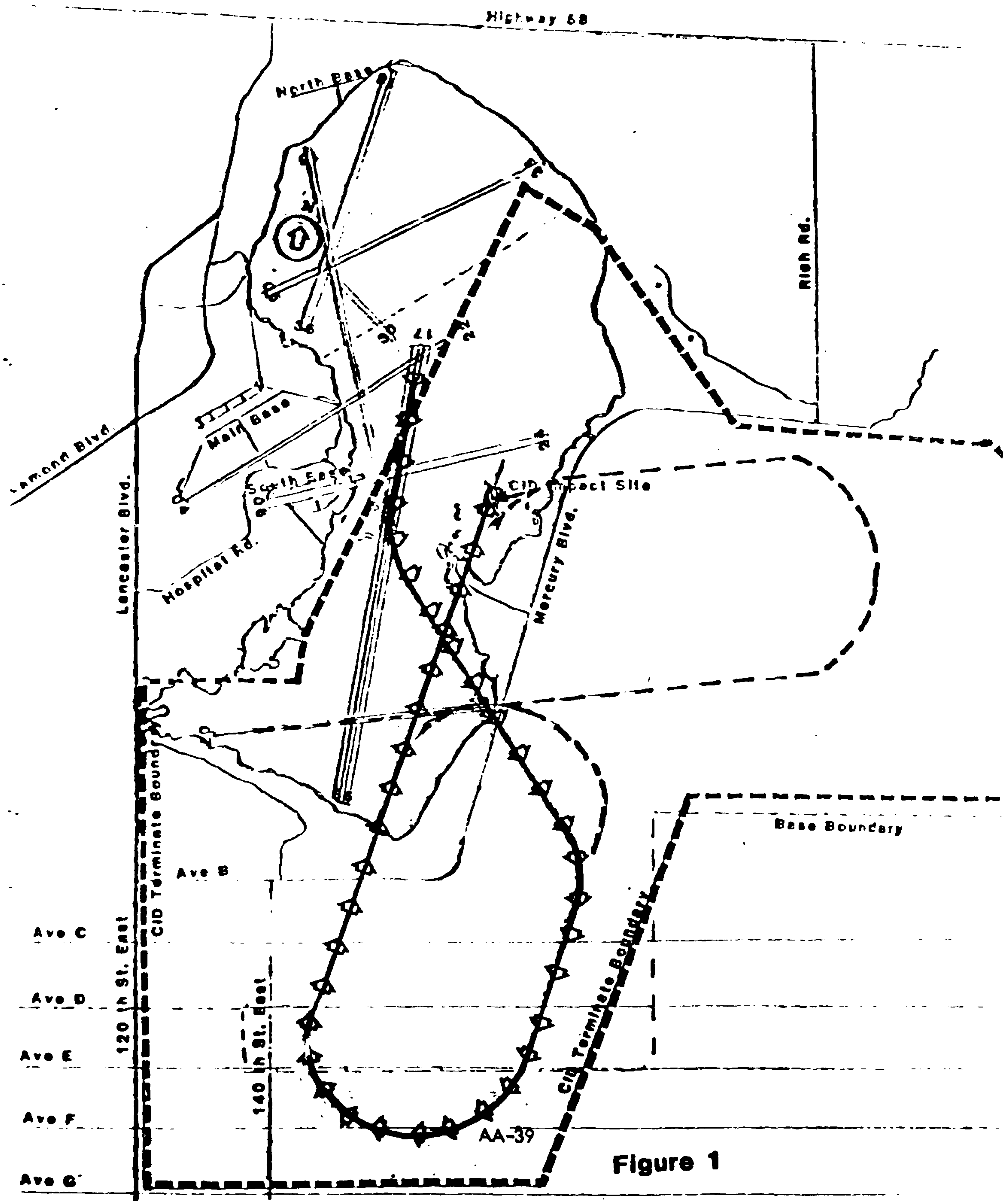
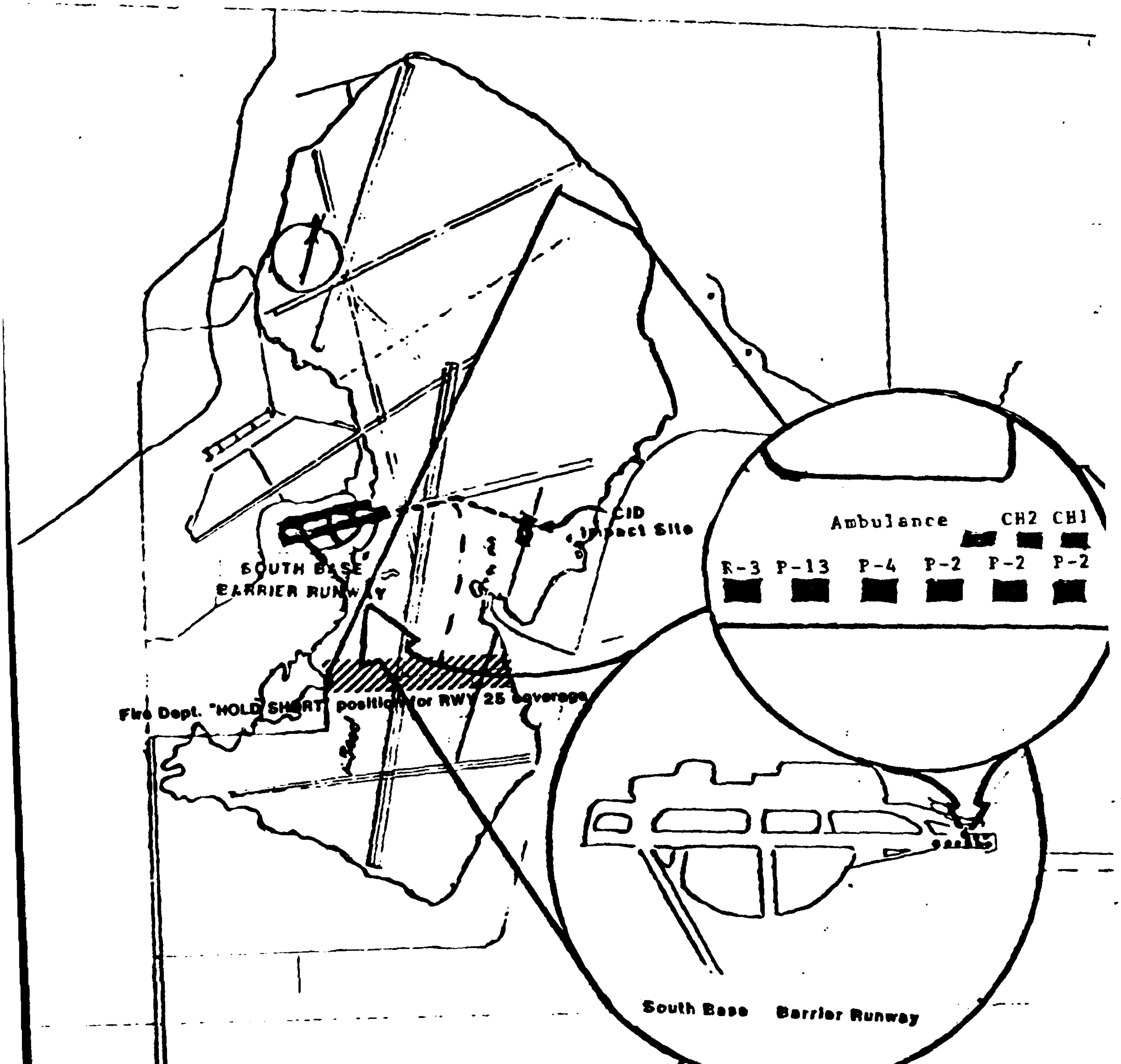


Figure 1

Fire Department Equipment Deployment



FIRE DEPARTMENT RESPONSE TIME AND DISTANCE TO TARGET SITE

DIRECT ROUTE : 1.0 Miles - 3:00 Min.

Fire Equipment to Start Rolling When CID/720 is at 1,000 Ft.

(60 Sec. prior to Impact)

Figure 2A

Impact Site - Security Control and Access

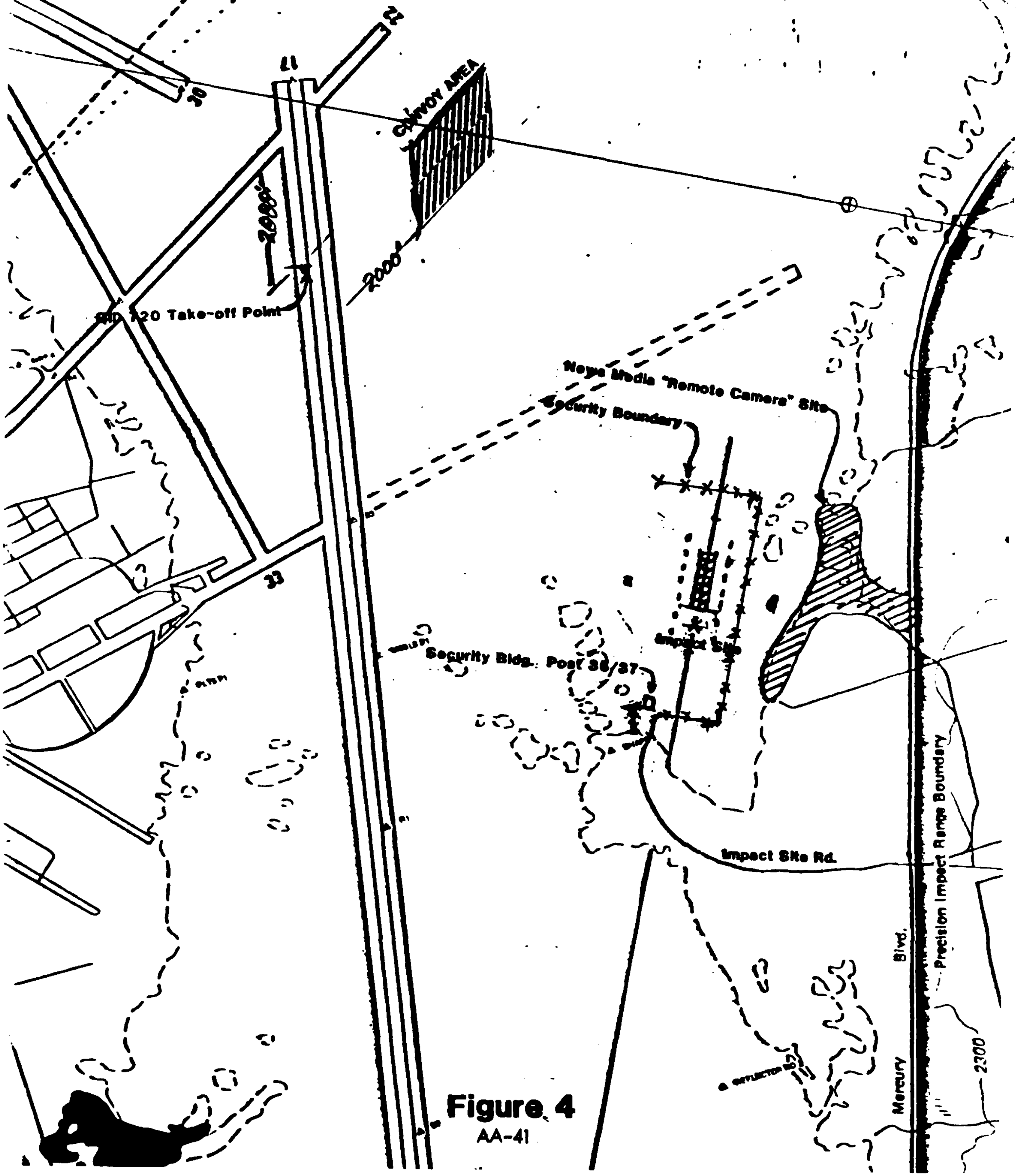


Figure 4

CID Security Control Points

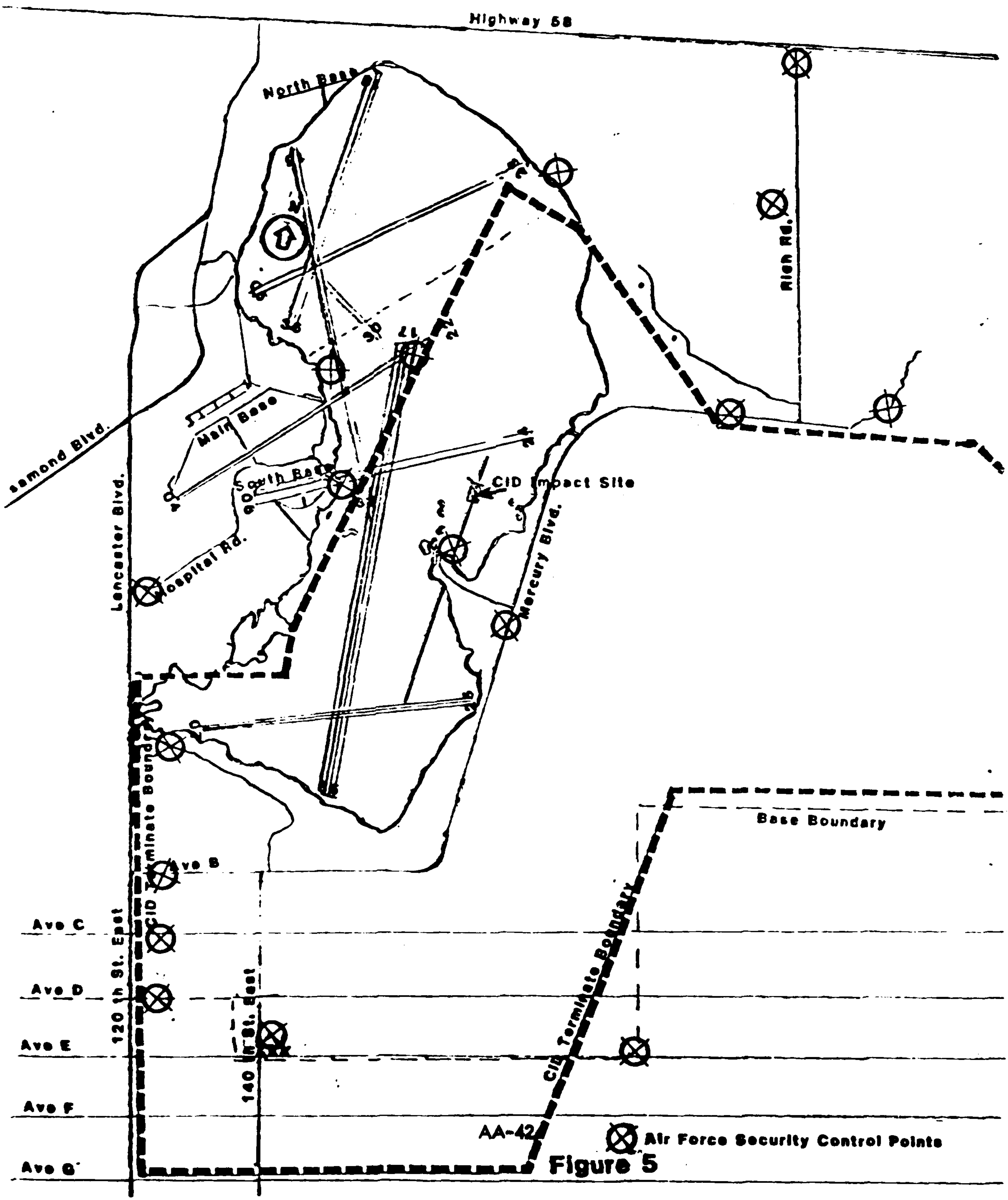
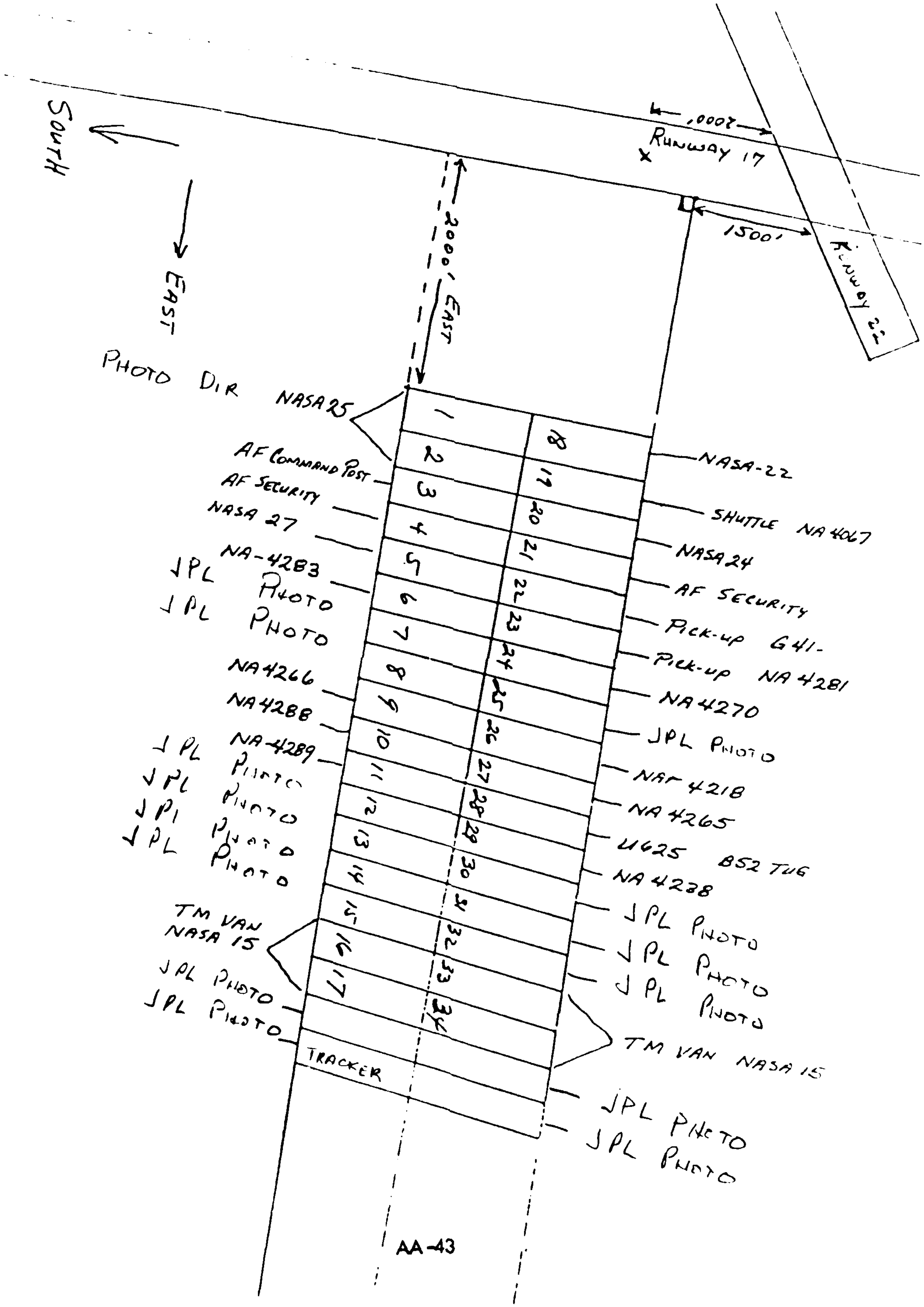
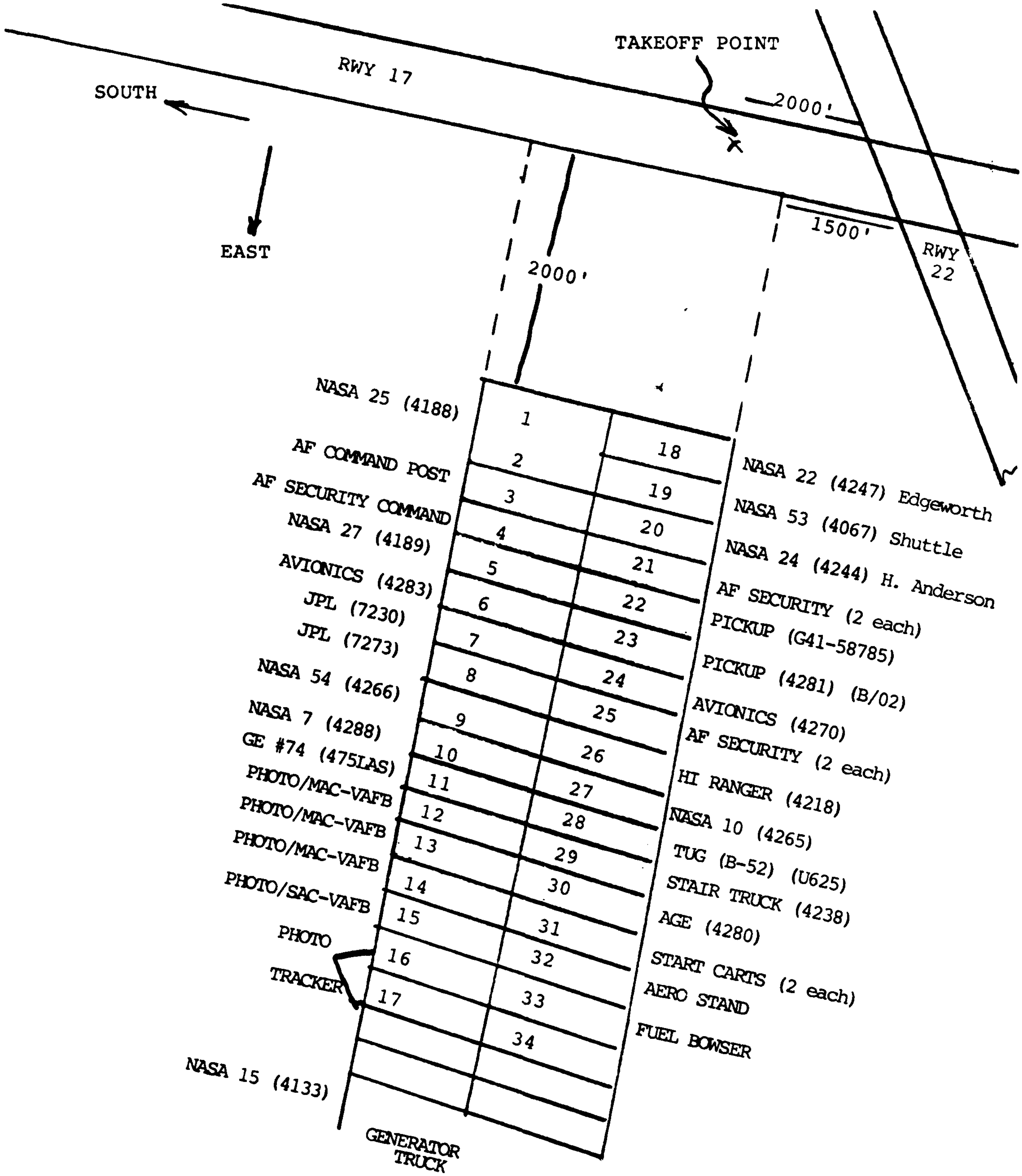


Figure 5


SOUTH
EAST
2000'
RUNWAY 17
1500'
RUNWAY 22
2000' EAST
PHOTO DIR NASA 25
AF COMMAND POST
AF SECURITY
NASA 27
NA-4283
JPL PHOTO
JPL PHOTO
NA 4266
NA 4288
NA-4289
JPL PHOTO
JPL PHOTO
JPL PHOTO
JPL PHOTO
TM VAN NASA 15
JPL PHOTO
JPL PHOTO
TRACKER
NASA-22
SHUTTLE NA 4067
NASA 24
AF SECURITY
PICK-UP G41-
PICK-UP NA 4281
NA 4270
JPL PHOTO
NAF 4218
NA 4265
U625 B52 TUG
NA 4238
JPL PHOTO
JPL PHOTO
JPL PHOTO
TM VAN NASA 15
JPL PHOTO
JPL PHOTO


TAKEOFF POINT
RWY 17
SOUTH
2000'
EAST
2000'
1500'
RWY 22
NASA 25 (4188)
1
18
AF COMMAND POST
2
NASA 22 (4247) Edgeworth
19
AF SECURITY COMMAND
3
NASA 53 (4067) Shuttle
NASA 27 (4189)
4
20
NASA 24 (4244) H. Anderson
AVIONICS (4283)
5
21
AF SECURITY (2 each)
JPL (7230)
6
22
PICKUP (G41-58785)
JPL (7273)
7
23
PICKUP (4281) (B/02)
NASA 54 (4266)
8
24
AVIONICS (4270)
NASA 7 (4288)
9
25
AF SECURITY (2 each)
GE #74 (475LAS)
10
26
HI RANGER (4218)
PHOTO/MAC-VAFB
11
27
NASA 10 (4265)
PHOTO/MAC-VAFB
12
28
TUG (B-52) (U625)
PHOTO/MAC-VAFB
13
29
STAIR TRUCK (4238)
PHOTO/SAC-VAFB
14
30
AGE (4280)
15
31
PHOTO
16
32
START CARTS (2 each)
TRACKER
17
33
AERO STAND
34
FUEL BOWSER
NASA 15 (4133)
GENERATOR TRUCK

CONVOY RF COMMUNICATIONS OVERVIEW

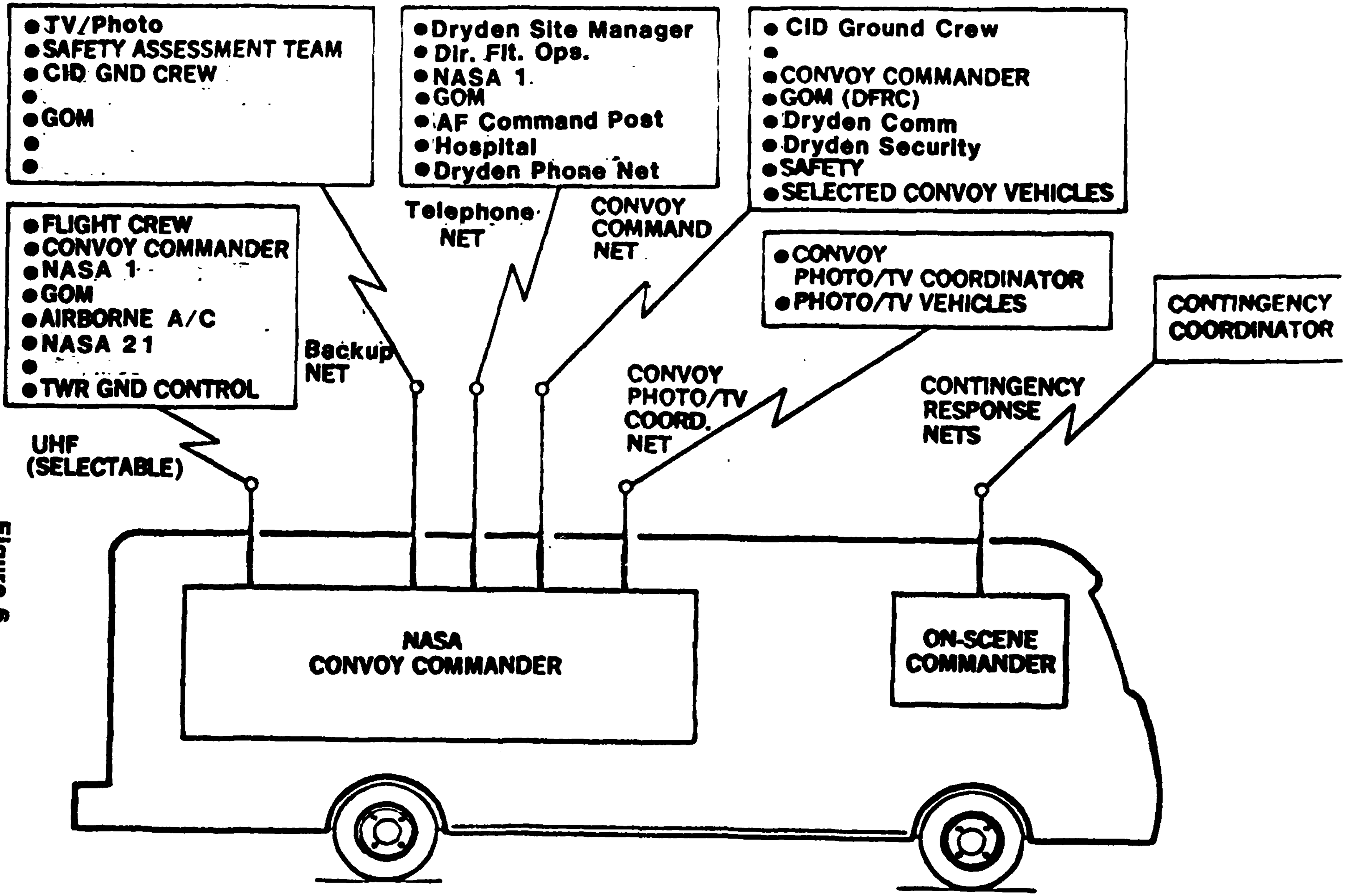


Figure 6

CONVOY COMMAND VEHICLE

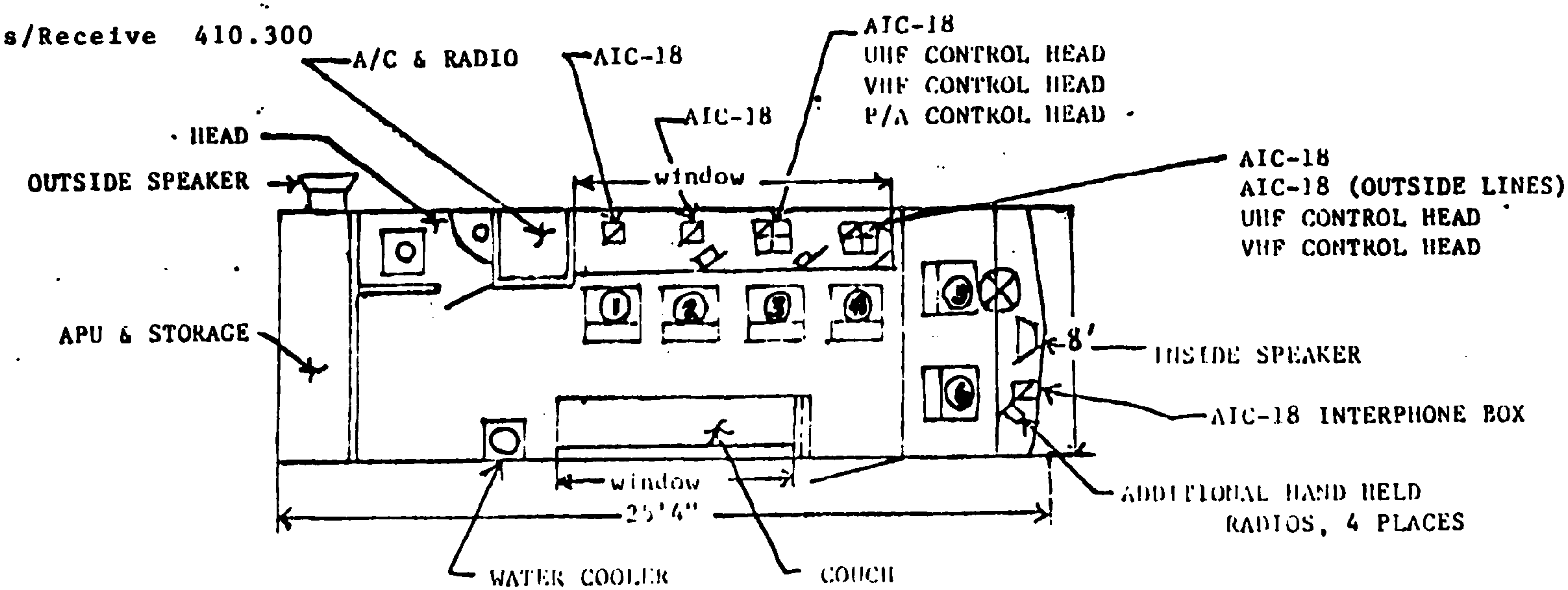
Position Descriptions

1. QA/Safety
2. Photo/TV Coordinator
3. Convoy Commander - Ground Ops Manager
4. AFFTC on scene commander
5. Vehicle driver
6. Convoy Commander (Dep.)

All additional hand held radios will have the following frequencies:

CH 2	Transmit	409.900
	Receive	417.250
CH 3	Transmit	409.350
	Receive	415.925
CH 1	Transmit	410.300
	Receive	416.350
CH 4	Trans/Receive	410.300

1	2	3	4	5	6
UHF-1 347.1	UHF-2 347.1	UHF-1 347.1	UHF-2 347.1	UHF-1	UHF-1 347.1
VHF-1 122.85	VHF-2 122.85	VHF-1 122.85	VHF-1 TWR/EDW GR	UHF-2	VHF-1 122.85
CH2 409.900 417.250	CH 2 409.900 417.250	CH 2 409.900 417.250	CH 2 409.900 417.250	UHF-2	CH 2 409.900 417.250
CH 3 409.350 415.925	CH 3 409.350 415.925	CH 3 409.350 415.925	Fire Dept 173.4375	VHF-2	CH 3 409.350 415.925
CH 1 410.300 416.350	CH 1 410.300 416.350	CH 1 410.300 416.350	VHF-FM 173.025 148.035		CH 1 410.300 416.350
Interphone	Interphone	Interphone	Interphone	Interphone	Interphone



NOTE: POSITIONS 1,2,3,4 & 6 will have headphones/microphone single jack capabilities.

Figure 6A

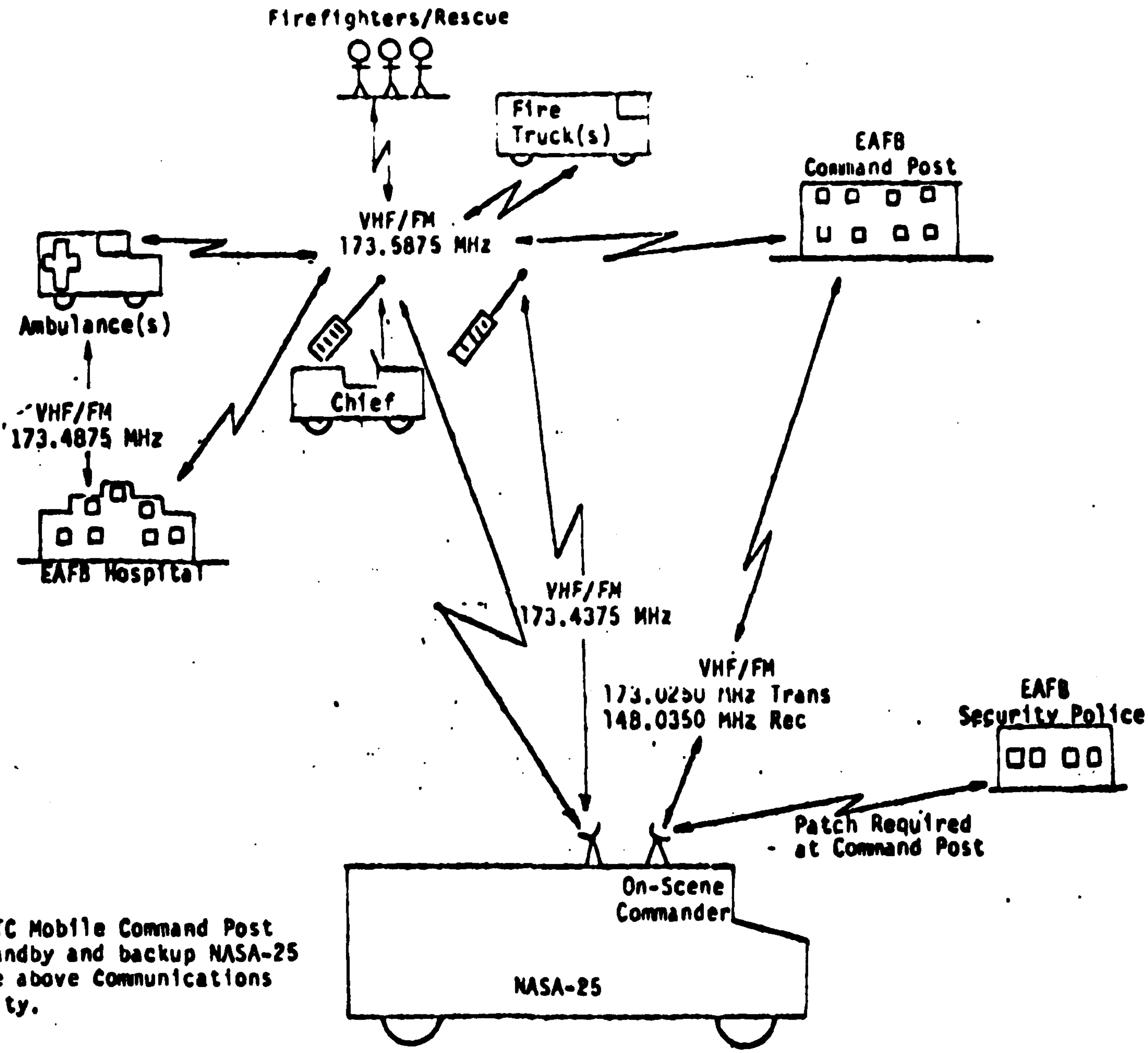
GROUND OPERATIONS FREQUENCIES:

GROUND OPS	CH 2 PRIMARY	TRANSMIT	409.900
		RECEIVE	417.250
PHOTO/TV OPS	CH 3 PRIMARY	TRANSMIT	409.350
		RECEIVE	415.925
GRUOND OPS AND PHOTO/TV		TRANSMIT	410.300
BACKUP OR SECONDARY CH 1		RECEIVE	416.350

AIR TO GROUND RADIO FREQUENCIES:

UHF PRIMARY	347.1
UHF SECONDARY	395.1
VHF PRIMARY	122.85
VHF SECONDARY	121.95

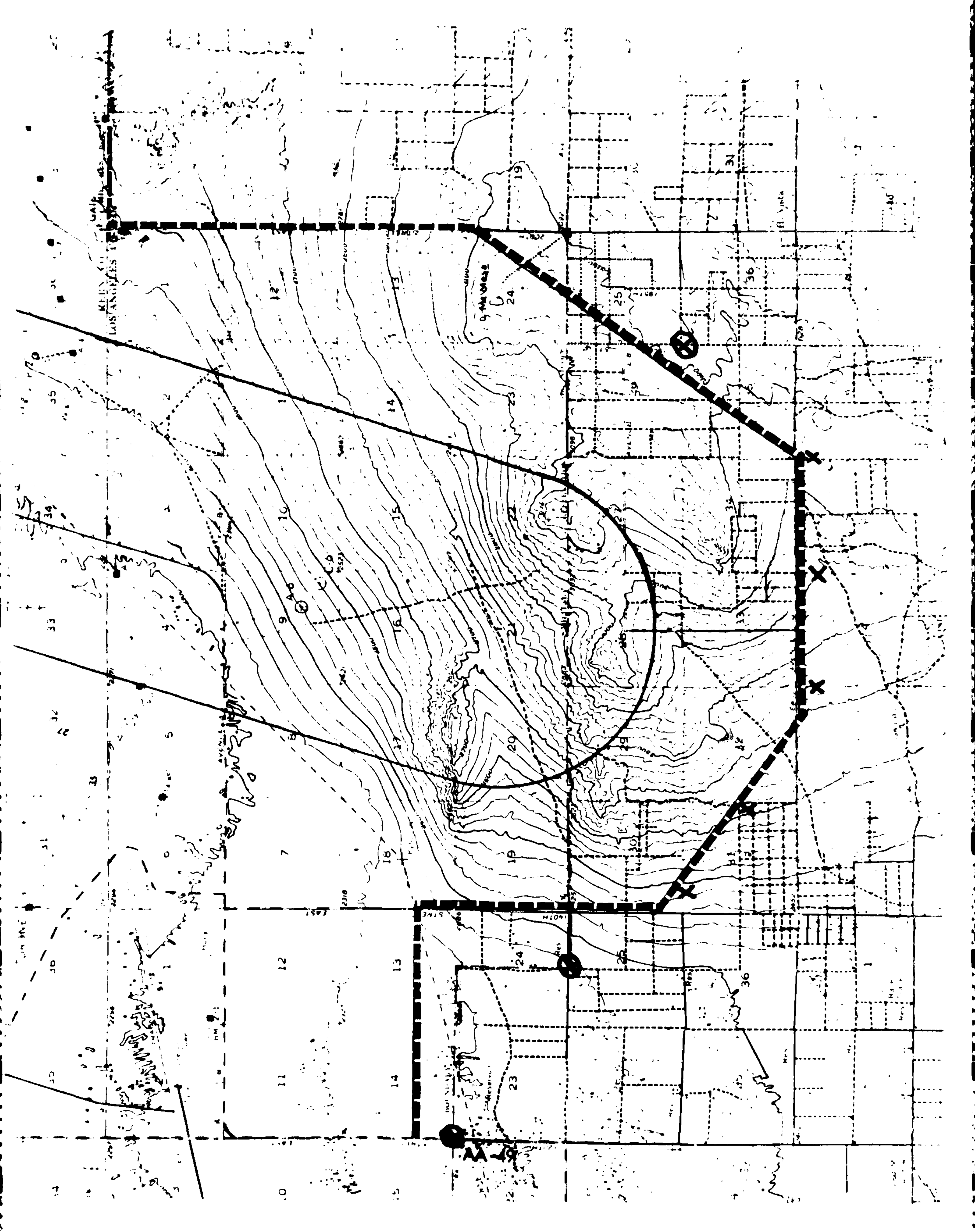
Figure 6B



The AFFTC Mobile Command Post will standby and backup NASA-25 with the above Communications capability.

FIREFIGHTERS/RESCUE COMMUNICATIONS

Figure 6C



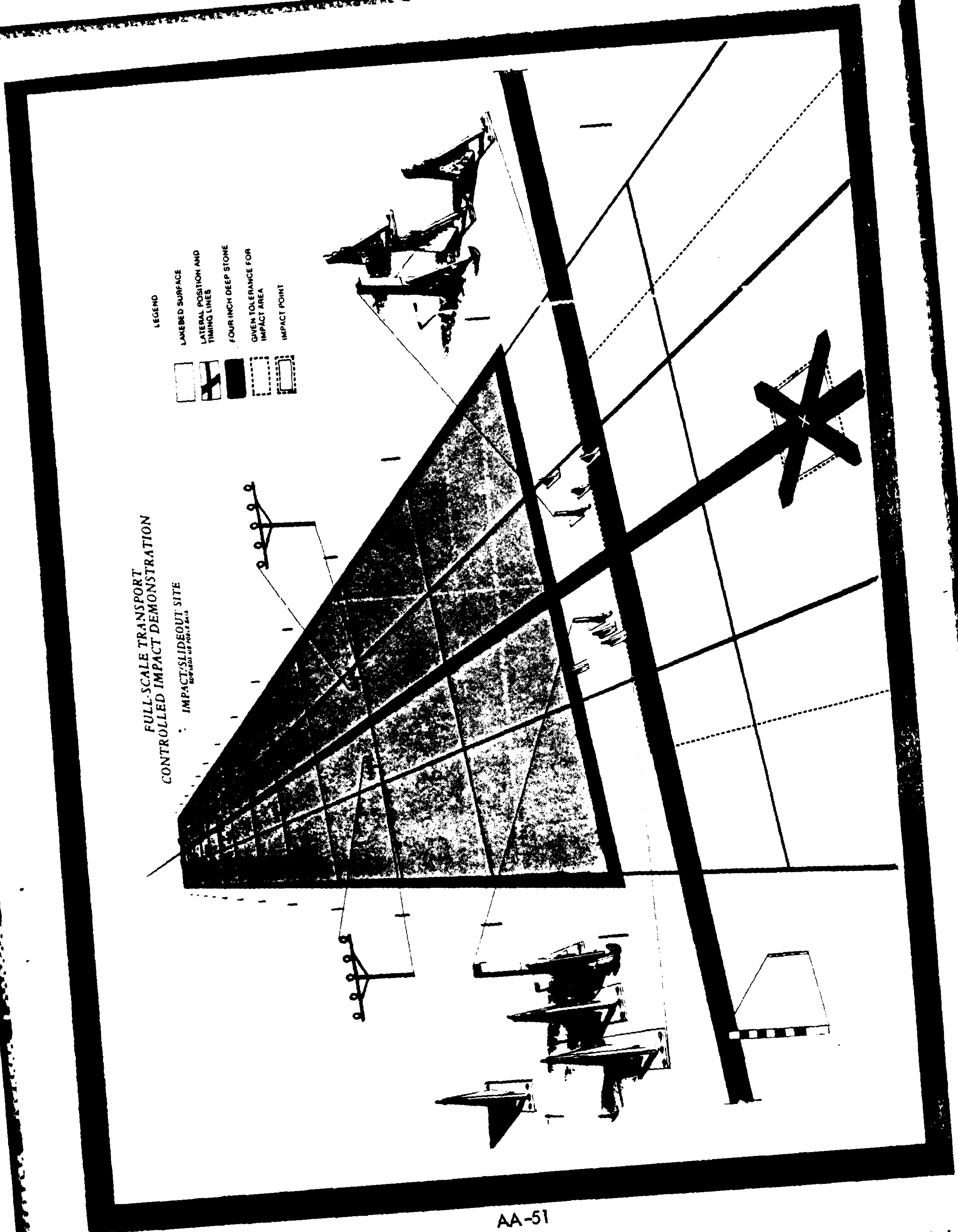
EVENT AND TIME TABLE

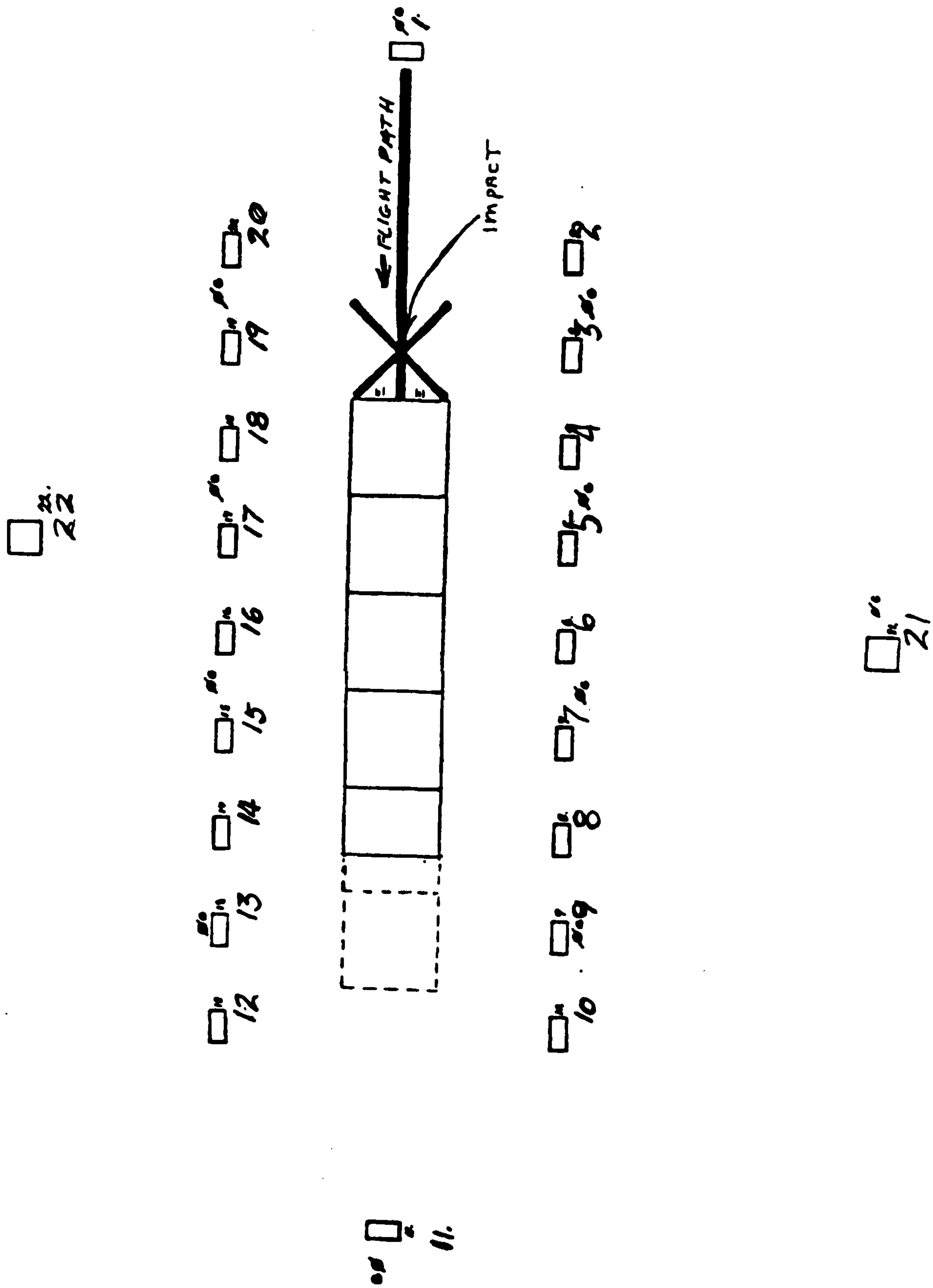
CID POST-IMPACT GROUND OPERATIONS

ACTIVITIES	RESPONSIBILITY	OPERATING PERIOD
GOM/CC/NASA 25	NASA	T-3 hrs thru T+1/2 DAY
IMPACT	CID TEAM	**T-0**
CRASH FIRE RESCUE	USAF	T+1 MIN. thru 30 MIN.
SECURITY	USAF/NASA	T-14 DAYS thru DURATION
SAFING	NASA	T+30 MIN. thru 1/2 DAY
AMK EXPERIMENT DOCUMENTATION	FAA/JPL	T+1/2 DAY thru T+2 DAY T+9 DAY thru T+10 DAY
CRASHWORTHINESS/FIRE SAFETY EXPERIMENT DOCUMENTATION	FAA/JPL	T+1/2 DAY thru T+3 DAY T+9 DAY thru T+10 DAY
POST-IMPACT INVESTIGATION	FAA	T+4 DAY thru T+8 DAY
EXPERIMENT/EQUIPMENT REMOVAL	FAA/NASA	T+11 DAY thru T+15 DAY
720 CARCASS REMOVAL	FAA/NASA	T+15 DAY thru T+29 DAY
SITE CLEAN-UP	USAF	T+30 DAY thru T+37 DAY

From T+0 to T+37 DAY - NO SMOKING SHALL BE PERMITTED WITHIN THE CONRTROLLED AREA OF THE IMPACT SITE

FIG. 3


FULL-SCALE TRANSPORT
CONTROLLED IMPACT DEMONSTRATION
IMPACT/SLIDEOUT SITE
LEGEND
LAKEBED SURFACE
LATERAL POSITION AND TIMING LINES
FOUR-INCH DEEP STONE
GIVEN TOLERANCE FOR IMPACT AREA
IMPACT POINT


FLIGHT PATH
IMPACT
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22

National Aeronautics and
Space Administration

Ames Research Center
Dryden Flight Research Facility
P O Box 273
Edwards, California 93523

NASA

Reply to Attn of: DOD 2/38

TO: CID Ground Operations Manager

FROM: Industrial Safety and Health Officer

SUBJECT: Recommendations for Work Space Hazard Identification CID Post Impact

The attached recommendations are the result of a meeting with Mr. Del Gandio of the FAA. We feel that by following these recommendations, we can minimize hazardous exposures and reduce the need for respiratory protection.

Please note that I should move to NASA 25 as soon as practical and will need a lake bed pass for this purpose.

If you have any further questions please let me know.

J.R. Shoemaker
J.R. Shoemaker
Industrial Safety and Health Officer

Recommendations To Be Added To CID Ground Operations Plan

The following are recommendations for Hazard Recognition/ Identification during initial post impact damage assessment to be performed by F. Del Gandio and J. Misplay representing the FAA/ NASA.

The following is the sequence of events that is currently envisioned:

1. Impact

2. Air Force Fire and Rescue Team extinguishes any fires threatening the B-720 fuselage. (The pooled fuels not threatening the fuselage will be allowed to burn for environmental considerations).

3. Air Force Fire and Rescue Team informs Ground Operations Manager (GOM) fire is out and access adequate for ingress, egress, and ventilation has been provided.

4. GOM will send the FAA damage assessment team, wearing Self-Contained Breathing Apparatus, to the aircraft in order to:

a. Determine the presence/absence of hazardous atmosphere or conditions by air monitoring as follows:

1. If no cabin fire, the air will be monitored for:

a. Combustible/explosive gases

b. Oxygen content (O_2)

c. Carbon monoxide(CO)

2. If cabin fire has occurred, the air will be monitored for:

a. Combustible/explosive gases

b. Oxygen (O_2)

c. Carbon monoxide (CO)

d. Hydrocyanic acid (HCN)

e. Hydrochloric acid (HCl)

f. Chlorine (Cl_2)

g. Hydrogen Fluoride (HF)

Table 1 has a list of the hazardous concentration for each item listed above. If the concentration listed is exceeded, personnel should not be allowed to enter the fuselage until the concentration can be reduced by forced ventilation. Respiratory protection will not be required while air samples remain below stated values. However, SCBA should remain available for personnel should conditions change.

b. Notify the GOM of the results of each measurement taken.

c. Resample general environmental conditions periodically and any specific location requested by the GOM, eg., immediate area of battery for explosive gas prior to disconnection.

5. After the results of the air samples indicate concentrations below hazardous levels, the GOM in consultation with the FAA Lead Investigator and the DFRF Industrial Safety & Health Officer sends the Aircraft System Safing Team to begin safing operations i.e., switches, circuit breakers, batteries and high pressure gas sources per check list.

   Additional personal protective equipment may be needed for specific safing activities, such as gloves or face shields while handling damaged batteries.

6. The Systems Safing Team then will retrieve the on board data such as film, tape, etc.

7. The DFRF Industrial Safety & Health Officer will procede to NASA Command Vehicle 25 aboard the first shuttle bus bringing relief personnel to the impact site to facilitate consultations with the GOM.

8. Prior to beginning each days' work, air samples must be taken per NASA confined space procedure to assure safe working conditions.

TABLE 1

Reference Chart of Potential Hazaradous Conditions

Agent Sampled	Sample Method	Hazardous Concentration (Theory)	Hazardous Concentration (Actual)	Recommended Actions
Combustible/Explosive Gases	Tritector	10% LEL	10% LEL	Evacuate all personnel and force ventilate aircraft.
Oxygen (O_2)	Tritector	<19.5% >25.0%	<19.5% >25.0%	Evacuate all personnel not wearing SCBA (Scott Air Pack), ventilate to increase O_2 level. If O_2 rich, evacuate.
Carbon Monoxide (color change to brownish green)	Drager Indicator Tube (2 strokes)	400 PPM	300 PPM	Evacuate all personnel not wearing SCBA and force ventilate.
Hydrocyanic Acid (HCN) (color change to red)	Drager Indicator Tube (5 strokes)	10 PPM	7.5 PPM	Evacuate all personnel and force ventilate aircraft.
Hydrochloric Acid (HCl) (color change to yellow)	Drager Indicator Tube (10 strokes)	5 PPM	3.5 PPM	Evacuate all personnel and ventilate.
Chlorine (Cl_2) (color change to yellow)	Drager Indicator Tube (10 strokes)	3 PPM	2.25 PPM	Evacuate all personnel not wearing SCBA and ventilate.
Hydrogen Fluoride (HF) (color change to pink)	Drager Indicator Tube (20 strokes)	3 PPM	2.25 PPM	Evacuate all personnel not wearing SCBA and ventilate.

NAME	DEACTIVATED				REMOVED FROM AIRCRAFT			
	YES	NO	MECH	DATE	YES	NO	MECH	DATE
FLAME GENERATOR - Disarming Procedure After Impact Sanders' personnel should disarm the system for safety reasons. The system should be depleated of fuel and oxygen by this time, but approach from the left side and ahead of the burner outlet to prevent injury in case the burner inadvertently ignites, i.e., exercise standard cautionary measures.								
1. Open the red access door on the tail cone.								
2. Turn the electrical master switch off (toward the bottom of the A/C								
3. Turn off oxygen bottle								
4. Cut the primary electrical ground								

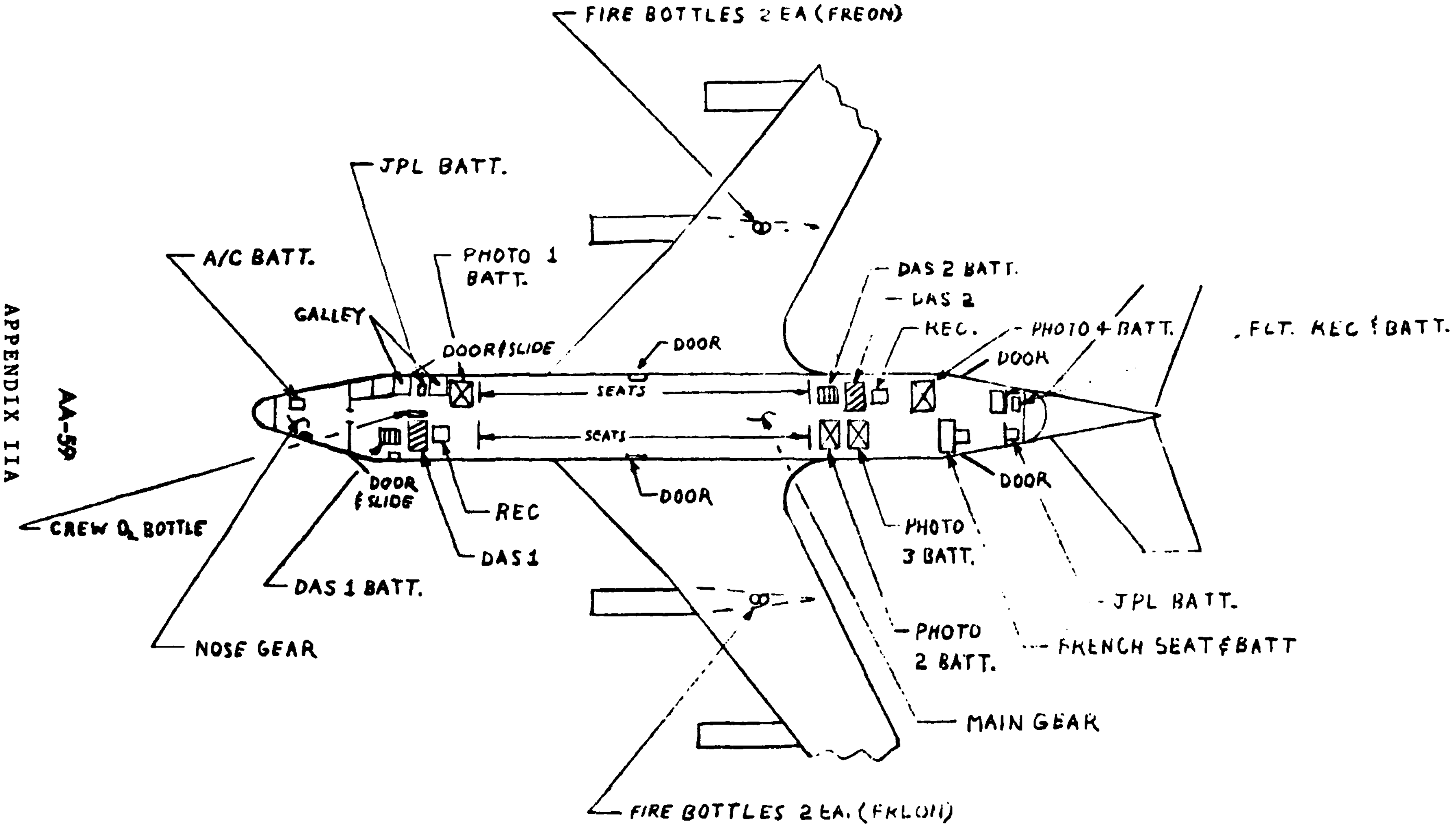
AIRCRAFT SAFEING

BATTERY NAME	TYPE	LOCATIONS	DEACTIVATED YES	NO	MECH	DATE	REMOVED FROM AIRCRAFT YES	NO	MECH	DATE
1. A/C Batt. (1 ea.)	Lead Acid 28 Volt	Nose Wheel Well								
2. Terminate Batt (1 ea.)	Nicad	Cockpit L/H Side								
3. AMK Power Batt (1 ea.)	Nicad	Fwd Cargo Bay B.S. 410								
4. Video VHS Batt Pack (1 ea.)	Alkaline	Fwd Cabin L/H Eye Level B.S. 390								
5. DAS #1 Batt (2 ea.)	Nicad	L/H B.S. 380 Floor								
6. Photo #1 Batt (2 ea.) (2 ea.)	Silver-Zinc Alkaline	B.S. 520 R/H Floor								
7. Photo #2 Batt (2 ea.) (2 ea.)	Siver-Zinc Alkaline	B.S. 1100 L/H Floor								
8. Photo #3 Batt (2 ea.) (2 ea.)	Silver-Zinc Alkaline	B.S. 1140 L/H Floor								
9. Photo #4 Batt (2 ea.) (2 ea.)	Silver-Zinc Alkaline	B.S. 1260 R/H Floor								
10. DAS #2 Batt (2 ea)	Nicad	B.S. 1000 R/H Floor								
11. French Seat Batt(1 ea.)	Dry Lead Acid	B.S. 1260 L/H Floor								
12. JPL Fwd (10 ea.)	Dry Cell Carbon/Zinc	B.S. 140 R/H								
13. JPL Aft (5 ea.)	Dry Cell Carbon/Zinc	B.S. 2080 L/H Aft Side, mounted on partition								
14. LAS (1 ea.)	Nicad	B.S. 1340 R/H Floor								
15. USN Elt Batt (2 ea.)	1 Lithium 1 Nicad	Dorsal Fin								
16. COCKPIT C/Bs & POWER SWITCHS										
17. EMERG. DOOR SLIDES (2)										
18. NOSE GEAR TIRES L/H										
R/H										
19. MAIN GEAR TIRES L/H										
R/H										
20. PYLON FIRE BOTTLES L/H (2)										
R/H (2)										
21. CREW OXYGEN BOTTLE										

National Aeronautics and Space Administration

FLIGHT OPERATIONS ENGINEERING SKETCH NO. [illegible] SHEET 1 OF 1

☐ CHANGE ☒ NEW DWGS AFFECTED	DESIGNED	DATE	APPLICATION 720 833
TITLE 720 BATTERY & HAZARD LAYOUT	DRAWN		W.O. NO.
REASON	APPRV'D N. Anderson	10/1/84	J.O. NO. P34018



fab	part number	add	rem	chg	instructions or part disposition

DFRC 368(8-19-78)

Dryden Flight Research C

TAPE - FILM - CAMERA RECOVERY LIST

ITEM	LOCATION	CONDITION	DATES	REMOVED SIGNATURE	INSP.
CAMERA - JPL	NOSE CONE				
CAMERA 1-C-1	COCKPIT R/H				
CAMERA - JPL	COCKPIT DORWAY				
CASSETTE HSV	AFT OF #1 POWER PALLET				
CAMERA 1-C-2	BETWEEN GALLEYS				
DAS #1 TAPE RECORDER TAPE	AFT OF DAS #1				
CAMERA 2-C-1	LH FUS. FWD. OF WING				
CAMERA 2-C-2	RH FUS. FWD. OF WING				
CAMERA 2-C-3	RH FUS. CENTER WING				
CAMERA 3-C-1	LH FUS. WING T.E.				
CAMERA 3-C-2	LH FUS. AFT. OF WING				
CAMERA 4-C-1	AFT. OF #2 DAS				
DAS #2 TAPE RECORDER TAPE	AFT. OF #2 DAS				
CAMERA 4-C-2	FWD. OF RH AFT. DOOR				
CAMERA 1-C-3	ABOVE #1 DAS				
TAPE FRENCH SEAT	FWD. OF LH AFT. DOOR				
CAMERA - JPL	VERTICAL TAIL				

APPENDIX BB

CID DAY LOG

CID DAY LOG

DECEMBER 1, 1984: ACTUAL PHOTOGRAPHIC/VIDEO FLIGHT CARD - THE CID DAY EVENTS AS THEY HAPPENED BY PHOTO RECORDER A. BURKE, IN NASA 25 GROUND OPERATIONS CONTROL VAN.

0400	NASA 25 ON SITE
0400	T. BURKE IN ROUTE TO NASA 25
0600	T. BURKE ARRIVE VIA EDDIE GROUND
0621	PHOTO 1 (J. GREGOIRE): CHECKING WITH PHOTO TEAMS NOTE: REAR AIRCRAFT DOOR & TAIL OFF LIMITS
0631	RE-ROUTED HARD LINE CAMERAS LAST NIGHT
0632	WEATHER CHECK FROM PHOTO 2 (W. SHIPMAN) - CLEAR
0633	PHOTO 3 - CLEAR (T. WYNNE) AT FIRE TRUCK
0634	PHOTO 6 - CLEAR (P. TRIMM) AT LAKE BED
0635	PHOTO 9 - WEATHER GOOD (J. HEWITT) AT LAKE BED
0639	PHOTO 4 (J. DAWSON) AT NASA 25 AREA TO SHOOT INSIDE PLANE
0643	PHOTO 6 SHOWS COLOR BARS
0645	HARD LINE SECURED
0646	CHECKED OUT ALL REMOTE - GOOD CHECKED OUT ALL VIDEO TRANSMISSION - GOOD
0647	NEED TO CHECK THE REMOTE YET FORM THE REMOTE AREA
0648	UHF MONITORING VHF
0650	REMOTE LINK FROM MOUNTS
0652	ALL CAMERA CHECKS HAS BEEN COMPLETED
0653	LAKE BED STILL CAMERAS IN CAMERA SYSTEM
0654	SHEPARD HAS THE SHEEP FROM PHOTO 5 (W. TIBBITTS) 0900 TAKE OFF ON SCHEDULE COPY/PHOTO 2 AND PHOTO 3
0659	14 PEOPLE TO EVACUATE CID SITE

0700	2 VEHICLES WITH JPL PERSONNEL AND 1 VEHICLE WITH ZYBION PERSONNEL LEAVING SITE
0710	VEHICLES ARRIVED AT 17/22
0714	NEED SPIN PHYSICS FOR A TRIGGER CHECK AT STATION 21 ON/OFF ALL OTHER CAMERAS ARE UN-PLUGGED (TRIGGER BOX)
0715	ALL CAMERAS ON
0716	GOM (A CALL TO DEPART LAKE-BED AREA) ALL OTHER CAMERAS ARE ON THE MOUNT
0718	LN2 CAMERA ON MOUNT
0722	INTERFERENCE
0724	TURNED SHUTTER OFF - GREAT PICTURE FLICKERING (FREE RUN) SHUTTER LOCKED UP
0725	PHOTO 1: EARLY EVACATION LEAVE AND ADVIS OF DEPARTURE TIME AND AMOUNT OF VEHICLES
0728	PHOTO 10: 4 VEHICLES ARE LEAVING TO C-7 AREA
0731	PHOTO 10 LEAVING FOR 17/22
0732	PHOTO 1 REQUESTED INFORMATION WITH CID SITE IF ALL EARLY EVACS HAVE LEFT
0739	2 OCCUPANTS HEADING TOWARD THE DIRECTION OF LAKE BE IN A LIGHT TAN SEDAN FROM PHOTO 7 (T. FAIL)
0741	VEHICLE LEAVING BY MAIN ENTRANCE - TAN CAR CLEAR OF CID SITE
0742	PHOTO 5: WILL BE AIRBORNE
0743	CHECKING OUT THE GUARD POST AT THIS TIME GOM OCCUPANTS UNKOWN
0744	FROM PHOTO 9 AT C/7 SITE TERRY AND COMPANY IN ROUTE, VEHICLES: NASA 4084, NASA 7239, OSTER IN POV
0745	ABC PEOPLE ON LAKE BED MUST BE TURNED OVER TO DRYDEN (AIR FORCE POLICE) STILL 0900 TAKE OFF
0753	PHOTO 2: UHF WORKS AND CAN RECEIVE (OPERATIONAL)
0754	PHOTO 3: READY TO GET ON FIRE TRUCK, WOULD LIKE TO DISCONTINUE TRANSMISSION

0755	PHOTO 1: WOULD LIKE TO HAVE PHOTO 3 CONTINUE TRASMISSION
0758	HANSON AND BIXLER REQUESTING PERMISSION TO CROSS LAKE BE TO 17/22 AREA. PERSMISSION OK'D BY GOM
0805	P-3 AIRCRAFT APPROACHING SITE
0812	PHOTO 7 TO CHECK IF LAST EVAC HAS LEFT
0815	EMERGENCY LANDING OF AIRCRAFT COMPLETED VAN ARRIVED AT 17/22 AREA (HANSON & BIXLER)
0818	ENGINES STARTED IN THE 720
0829	PHOTO 1: REQUESTING INVENTORY OF VEHICLES AND PERSONNEL AT 17/22 AREA PHOTO 10: ALL SYSTEMS OPERATIONAL
0831	GOM: ARE YOU READY TO SUPPORT PROJECT? PHOTO 1: YES, WE ARE READY TO SUPPORT PROJECT.
0832	PHOTO 1: 10 MINUTES TO EVAC/ARE RECORDERS TURNED ON AND AND ARE YOU READY FOR EVAC?
0833	PHOTO 1: HOW READY FOR EVACUATION?
0834	NO TRANSMISSION
0835	PHOTO 10: THERE ARE 19 PERSONNEL AND 1 EXTRA VAN
0837	EVACUATION READINESS
0838	PHOTO 10: EXTRA VAN IS HANSON AND BIXLER
0840	PHOTO 1: 5 MINUTES TO LATE EVAC TIME. PHOTO PERSONNEL TO LEAVE CID SITE
0842	PHOTO HELICOPTERS IN SIGHT PERSONNEL EVACUATION
0844	PHOTO/BRIDGES - NO TRANSMISSION
0845	PHOTO 1: LAKE EVACUATION TO LEAVE NOW, NEED IDENTIFICATION OF OF PERSONNEL
0846	PHOTO 6,8 PROCEEDING TO 17/22. ALL PERSONNEL HAVE LEFT LAKE BED PHOTO 10: ONLY NASA 4098 AND 2 NASA VANS LEFT ON SITE
0847	GOM TO PHOTO 1: STOP LATE EVAC, THERE IS A 10 MINUTE DELAY

0848	PHOTO 1: RECORD TIME TO STOP EVAC FOR CAMERA INFO.
0849	GOM TO PHOTO 1: DISARM CAMERAS AND RETURN TO SITE PHOTO 1: LATE EVAC TO RETURN TO SITE AND DISARM CAMERAS
0855	GOM TO PHOTO 1: EGRESS FROM SITE PHOTO 1: TURN CAMERAS ON AND EVACUATE SITE
0857	PHOTO 6: APPROACHING NORTH OF OF CID SITE STOPPING AT STATION 13 PHOTO 1: DO YOU HAVE ANY MORE STOPS?
0858	PHOTO 6: LEAVING CID SITE WITH 3 VEHCILES
0859	PHOTO 1: WHAT IS YOUR CURRENT LOCATION FROM EVAC AREA?
0900	NASA 25 CHANGING POSITIONS
0902	PHOTO 6: F TROOP HAS ARRIVED
0904	8 MINUTES TO TAKE OFF
0906	JPL ON-BOARD CAMERAS STARTED
0907	DOOR CLOSED/EGRESS FROM PLANE COMPLETED
0909	CLEARED FOR TAKE-OFF/NOSE CHOCK REMOVED/ALL AREAS READY
0910	HOLD CALL FOR POV AND UNAUTHORIZED PERSONNEL
0912	AREA (185/E) UNAUTHORIZED PERSONNEL ON PRIVATE PROPERTY GO AHEAD CHOCKS REMOVED AGIAN/CLEARED FOR BRAKE RELEASE
0914	TAKE OFF
0915	AIRBORNE
0917	NASA 25 IN PLACE
0922	IMPACT WITH FIRE/NOSE TURNED TO WEST
0926	NASA 25 TO SITE
0928	PHOTO 1: ALL PHOTO PERSONNEL CONTINUE WITH FILM FOR FIRE COVERAGE/STILL BURNING STATION 16 HAS ACTION
0945	AMBULANCE TO SITE/NO FENCE UNTILL FIRE IS OUT

0947	STILL BURNING CAN COUNT 4 YELLOW SUITES WITH CAMERAMEN ON-BOARD FIRE TRUCKS
0958	IMPACT 45 DEGREES TO PORT/CUTTERS RIPPED STARBOARD AREA RIGHT WING SEVERED/TAIL CAMERA NOT IN JEOPARDY STILL VERY SMOKEY
0959	STILL BURNING COUNT 4 YELLOW SUITS
10005	STILL BURNING COUNT 4 YELLOW SUITS
1020	PERSMISSION TO GIVE LAKE BED BADGES TO PHOTO PERSONAL TO STOP CAMERA SYSTEMS
1026	CHECKED MOUNT WITH BINOCULARS/STILL NOT MOVING
1051	PHOTO 5: P-3 ORIEN AT NASA

APPENDIX CC

Letter from Caesar A. Caiafa
Manager, Crashworthiness/Structural
Airworthiness Branch, ACT-330, August 27, 1984

with

ENCLOSURE 2 (SIMULA INSTRUCTIONS)

FEDERAL AVIATION ADMINISTRATION

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Full-Scale Transport Controlled Impact Demonstration Program

NASA

SUBJECT: INFORMATION: Pretest Photographic Documentation of FAA Crashworthiness Experiment, Attachment M (Enclosed)

DATE: August 27, 1984

Lawrence M. Neri

FROM: Caesar A. Caiafa
Manager, Crashworthiness/Structural
Airworthiness Branch, ACT-330

TO: John Gregoire

Per your conversation with our Mr. Dick Johnson on August 23, we wish to provide the following instructions concerning subject photographic documentation.

Structure (fuselage/wing)

As provided under the enclosed "Attachment M," high resolution photographic (still) coverage of all interior/exterior structure areas including installed accelerometer/strain gage bridge intrumentation will be needed. I (or a designated technical representative) will be available to direct your photographic team on these areas of interest. Please contact me on FTS 482-4284 regarding date in which you plan to begin this photographic activity.

Seat Restraint System

In support of the seat restraint system (and instrumentation) photo requirements per attachment M, our contractor, Simula, Inc., has provided the enclosed detail instructions on photographic coverage of the 22 experimental seats they are personally responsible for. These instructions should also be applied to the remaining experimental seat in the cabin including the FAA pilot seat (and instrumented dummy), the FAA composite seat (J), FAA forward flight attendant seat, the French seat and two NASA seats (pending approval by R. Hayduk). While these instructions should be surfice without our (or contractor) assistance, Mr. Dick Johnson (FTS 482-4280) will be available during certain pretest periods to advise photo team, as may be needed.

Stowage Compartment/Galley

As provided under Attachment M, photographic coverage of each of two forward galleys and two overhead stowage compartments should contain front, side and top views to include all attachment and instrumentation areas, and inside shots (doors open) with and without internal contents. Mr. Dick Johnson will be available during certain pretest periods to advise photo team, as may be needed.

Flight Data Recorders

Three FAA flight data and one NAVY flight incident recorders are located on a pallet in the aft cabin and tail section of aircraft. A front, side, and top view should be taken of their installation includeing related instrumentation. Mr. Leo Garodz will be available during certain pretest periods to advise photo team as may be needed.

General

Completed photographs obtained from the above activity can be in "roll" form and should be sent to this office for reivew (or reviewed by our office personnel at NASA-Dryden) and disposition. If additional coverage of any area is needed subsequent to this review, we will contact you accordingly.

Enclosure 1 (Attachment M)
Enclosure 2 (Simula Instructions

#

cc:
CID Team Members (w/o attachments)
ACT-300C (w/attachments)

SJN 00172

Simula Inc.

August 24, 1984

Mr. John Gregoire
Bldg 111
Jet Propulsion Laboratory
4800 Oak Grove Dr.
Pasadena, CA 91109

Dear Mr. Gregoire:

Thank you for your willingness to photograph the Simula seat experiments using a set of instructions. It spares us the time and expense of a trip out to Edwards.

The Simula seats are all those forward of seat "J." I have included a photograph to eliminate any confusion.

The four sheets of instructions are, hopefully, self-explanatory, and will also be used in the postcrash photo session. I should point out that I have assumed you have access to lenses of assorted focal lengths. The camera angles shown in Sheet 1 will probably require a 35-mm lens, in Sheet 2, a 28-mm lens, and in Sheets 3 and 4, a 50-mm lens. These are only suggestions, but I would appreciate it if a record could be kept of which lenses are used for Sheets 1 through 4. This is to ensure continuity between pretest and posttest seat photos.

The lettered placards are enclosed for use per the instructions. For example, when seat "H" on the left side of the plane is photographed, placards "H" and "L" will be placed adjacent to each other in view of the camera. If you have a letter-identifying system of higher contrast that you prefer to use, feel free to do so.

It should be noted that we would prefer the entire seat not be included in the photos per Sheet 2; only the area indicated in the example should be shown. Also, the photos in Sheet 1 should be taken from the aisle.

If you have any questions, please call me at (602) 438-1446.

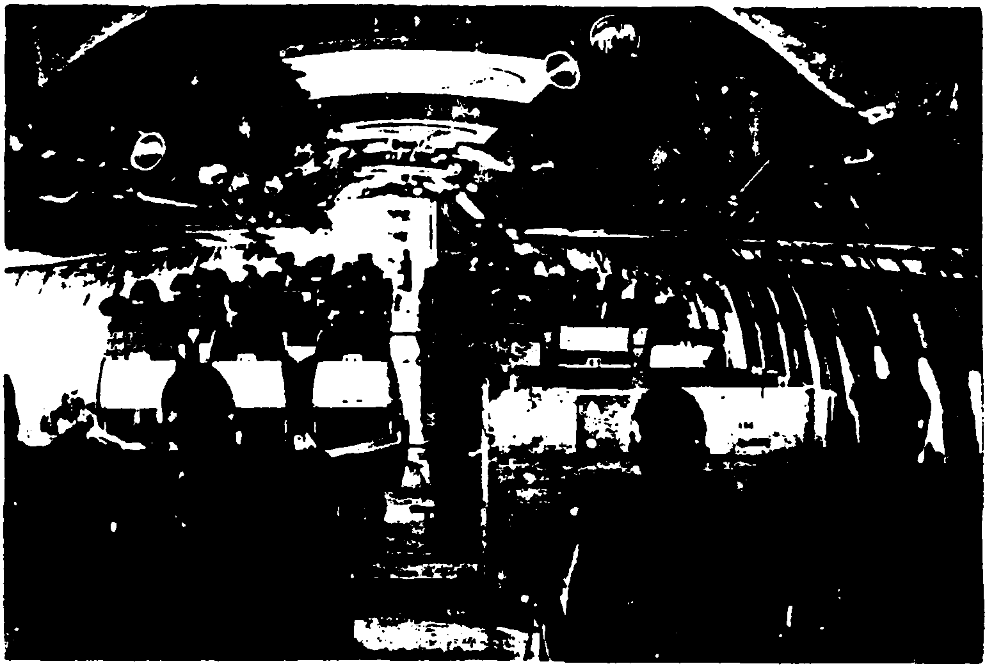
Sincerely,

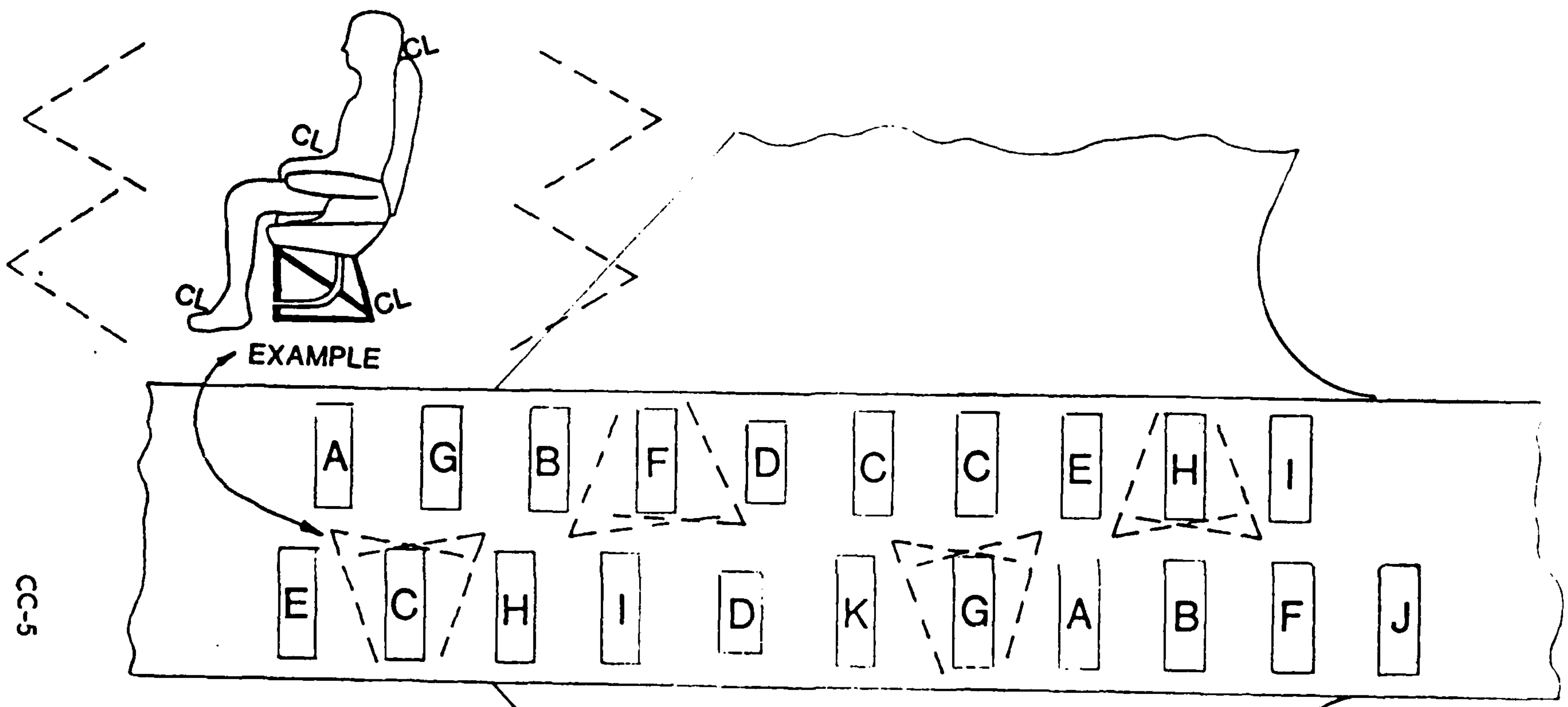
Mark R. Cannon

Mark R. Cannon
Project Engineer

MRC/pjh

Enclosures



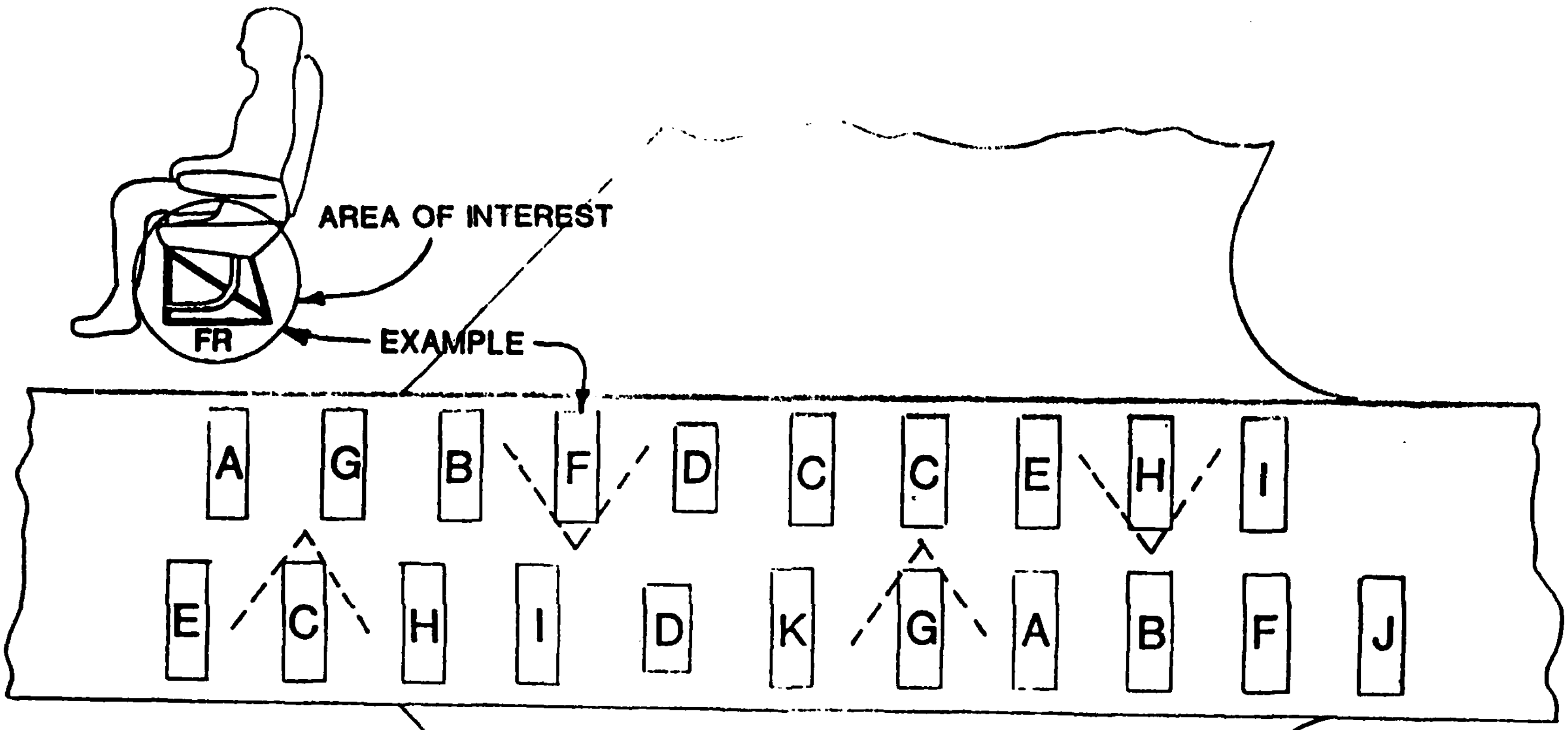


REMOVE ANY PARAPHENALIA FROM THE DUMMIES (Indian feathers, sunglasses, headphones

PHOTOGRAPH FRONT AND REAR OF ENTIRE SEAT FROM TWO HEIGHTS AS SHOWN (21 SEATS)

INCLUDE SEAT I.D. PLACARD IN ALL VIEWS

SIMULA 720 SEAT EXPERIMENTS

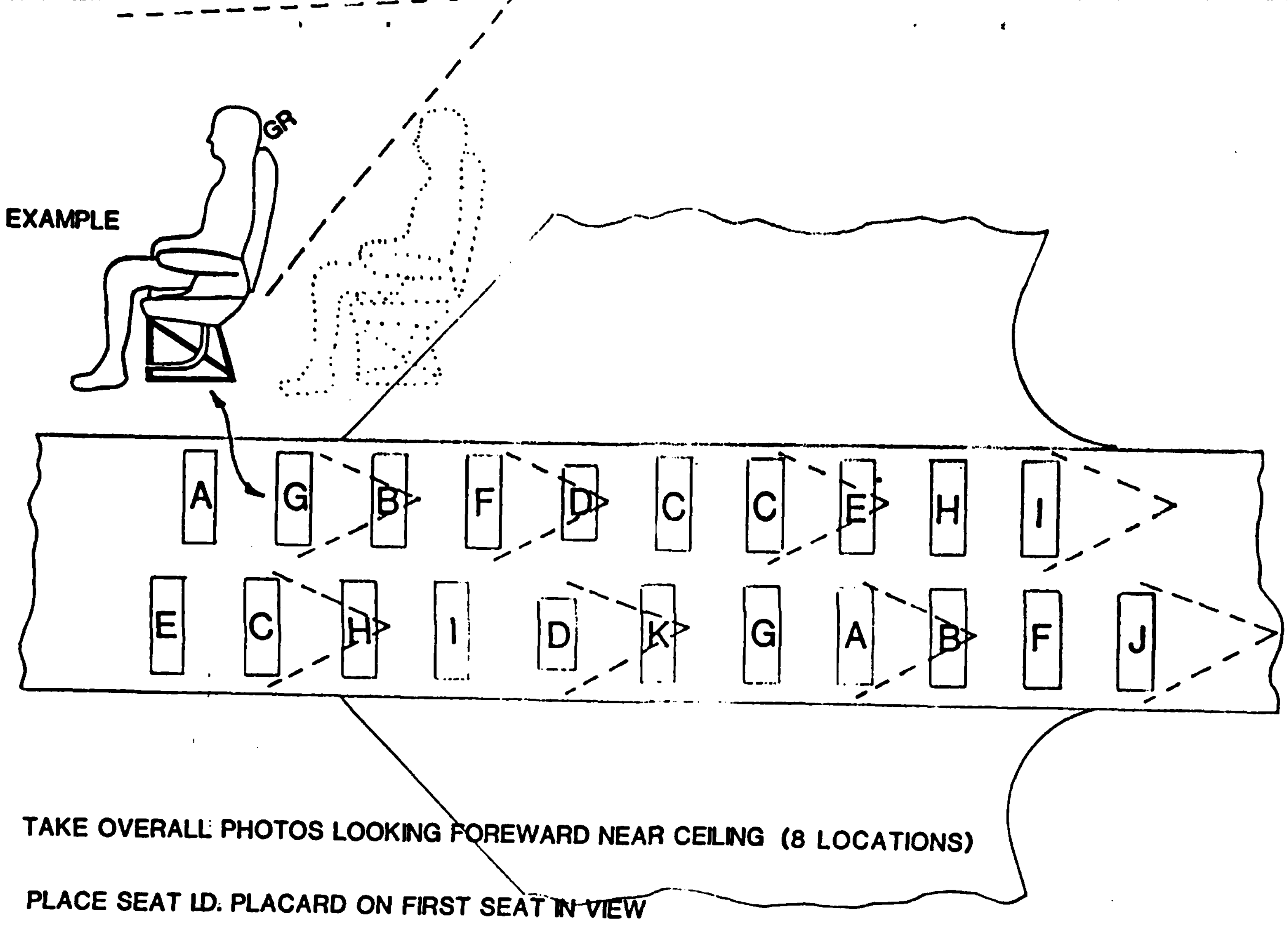


PHOTOGRAPH END VIEW OF ALL SEATS FROM AISLE (21 SEATS)

INCLUDE SEAT I.D. PLACARD IN PHOTO

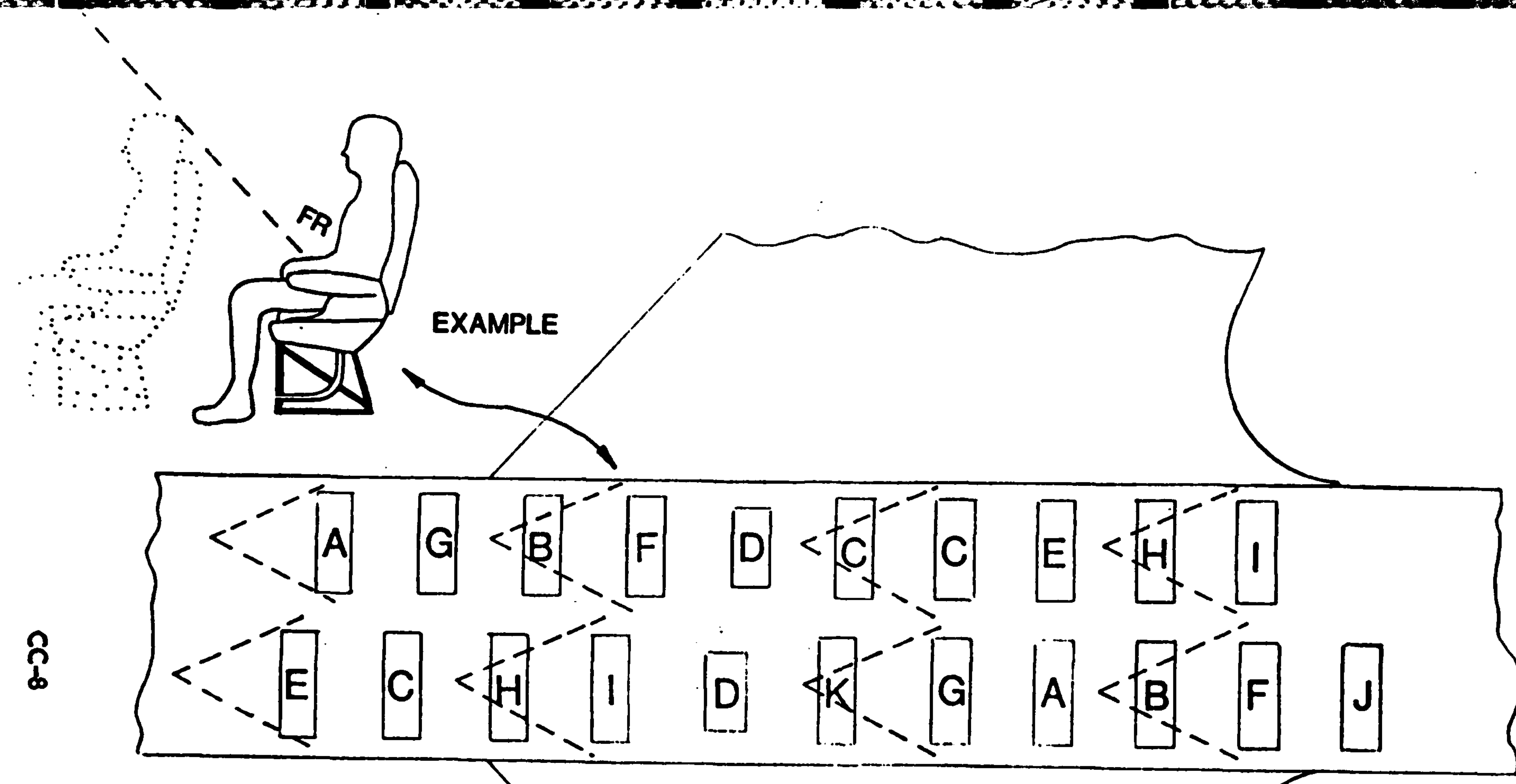
SIMULA 720 SEAT EXPERIMENTS

2



SIMULA 720 SEAT EXPERIMENTS

3



TAKE OVERALL PHOTOS LOOKING REARWARD NEAR CEILING (8 LOCATIONS)

PLACE SEAT I.D. PLACARD ON FIRST SEAT IN VIEW

SIMULA 720 SEAT EXPERIMENTS

4

APPENDIX DD

STANDARD DISTRIBUTION LIST

Region Libraries

Alaska	AAL-64
Central	ACE-66
Eastern	AEA-62
Great Lakes	AGL-60
New England	ANE-40
Northwest-Mountain	ANM-60
Western-Pacific	AWP-60
Southern	ASO-63d
Southwest	ASW-40

Center Libraries

Technical Center	ACT-64
Aeronautical Center	AAC-44.4

Civil Aviation Authority
Aviation House
129 Kingsway
London WC2B 6NN England

Embassy of Australia
Civil Air Attache
1601 Mass Ave. NW
Washington, D. C. 20036

Scientific & Tech. Info FAC
Attn: NASA Rep.
P.O. Box 8757 BWI Aprt
Baltimore, Md. 21240

DOT-FAA AEU-500
American Embassy
APO New York, N. Y. 09667

Headquarters (Wash. DC)

ADL-1
ADL-32 (North)
APM-1
APM-13 (Nigro)
ALG-300
APA-300
API-19
AAT-1
AWS-1
AES-3

OST Headquarters Library

M-493.2 (Bldg. 10A)

University of California
Sers Dpt Inst of Trsp Std Lib
412 McLaughlin Hall
Berkely, CA 94720

British Embassy
Civil Air Attache ATS
3100 Mass Ave. NW
Washington, DC 20008

Dir. DuCentre Exp DE LA
Navigation Aerineene
941 Orly, France

Northwestern University
Trisnet Repository
Transportation Center Lib.
Evanston, Ill. 60201

Dr. Frank A. Albini
Northern Forrest Fire Lab
Drawer C
Missoula, MT 59806

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Abell House, Room 643
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Captain Ralph Combariati
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